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System Installation
Guide

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Introduction 1

Who Should Use These Instructions

The following procedures are written for system integrators, value added resellers, and technicians. The procedures assume familiarity with the safety practices and regulatory compliance required for using and modifying electronic equipment.

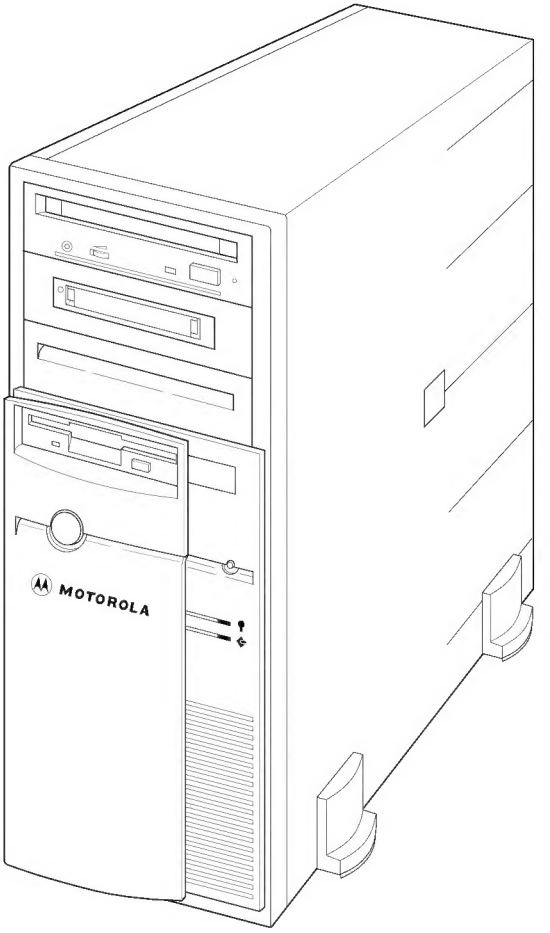
After You Unpack the System

Save all boxes and packing material if you need to repack the system in the future.

System Features

The system supports:

- 604e-166 MHz or 604e-200 MHz PowerPC microprocessor
- Second-level (L2) cache module socket
- Four 168-pin DIMM sockets
- PS/2 keyboard and PS/2 mouse ports
- Two DB9 asynchronous serial ports and one DB25 parallel port
- 2 PCI, one shared PCI/ISA, and two ISA expansion slots
- Integrated audio
- Integrated 10/100MB Ethernet
- Low/high-density floppy disk controller
- Five SCSI drive bays supporting Fast/Wide SCSI-2



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System Specifications

The system requires minimum maintenance and care to keep it operating properly. A proper environment for the computer means placing the unit within the appropriate temperature, humidity, and altitude ranges. See the next table for a list of these environmental ranges. For the best performance of the computer and for the comfort of the operator, it is better to place the computer in the middle of these environmental ranges. It is important that the environmental conditions not change abruptly.

Table 1-1. System Specifications

Enclosure Dimensions	Height: Width: Depth: Weight:	15.9 in. (404 mm) 6.7 in. (170 mm) 15.5 in. (394 mm) 17 lb. (7.7 kg) typical
Input Voltage	115 Vac/230 Vac selectable, 60 Hz/50 Hz	
Safety	UL1950 CSA C22.2/950 VDE 0805 EN 60 950/IEC 950	(Standards for safety of information technology equipment, including electrical business equipment)
Altitude	Operating: Non-operating:	10,000 ft. (3048 m) 30,000 ft. (9144 m)
Acoustic Noise Level	38 dBA maximum	
Temperature	Operating: Non-operating:	5° C to 35° C (41° F to 95° F) -25° C to 65° C (-13° F to 149° F)
Relative Humidity	Operating: Non-operating:	20% to 80% 10% to 90%
Shock	Operating: Non-operating:	0.5 G 15 G

Before You Install the System

2

In this section, you will find the following information:

- Guidelines for Locating the System, page 2-2
- Front Panel, page 2-3
- System Motherboard, page 2-4

2

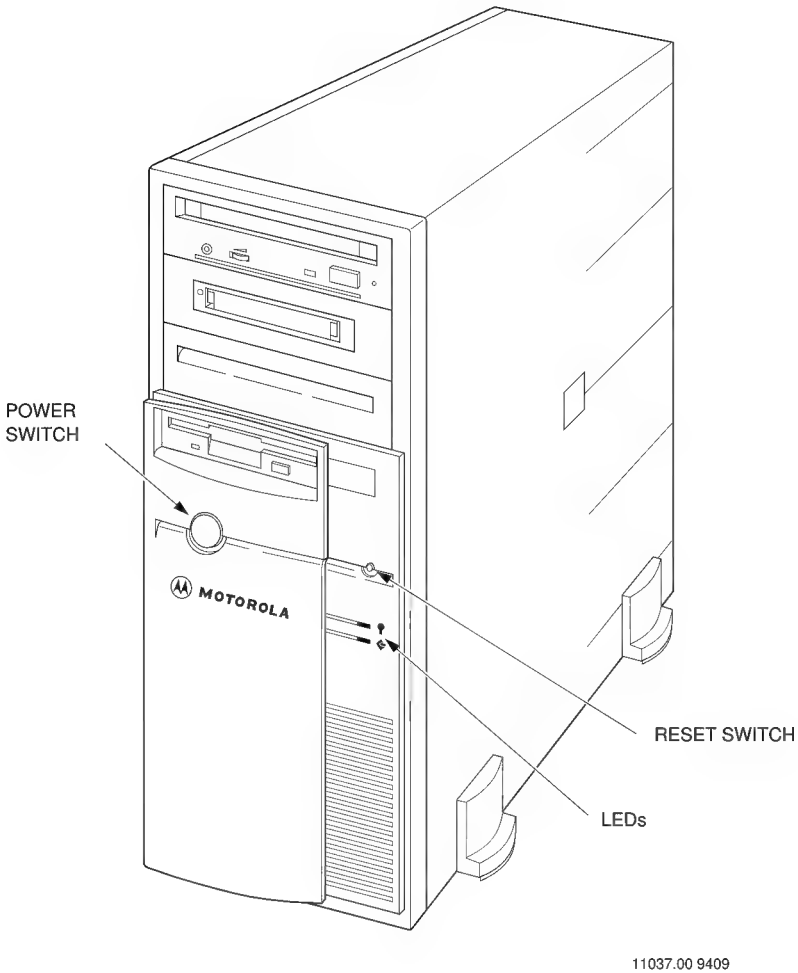
Guidelines for Locating the System

Before you begin to set up and cable your new system, consider these guielines for locating your system:

- Locate the system in a stable area, free of excess movement and jarring
- Install the system safely; ensure cables and cords are out of the way
- Ensure the set-up is comfortable for users
- Allow room for proper air flow for cooling
  Allow at least six inches of space around all sides of the computer.
- Locate the computer where it can be easily serviced (front and rear)
- Provide an area free of excess heat, dust, smoke, and Electro-Static Discharge (ESD)

Front Panel

The power-on switch is located on the front of the computer. LEDs on the front panel of the computer indicate power present and disk activity.



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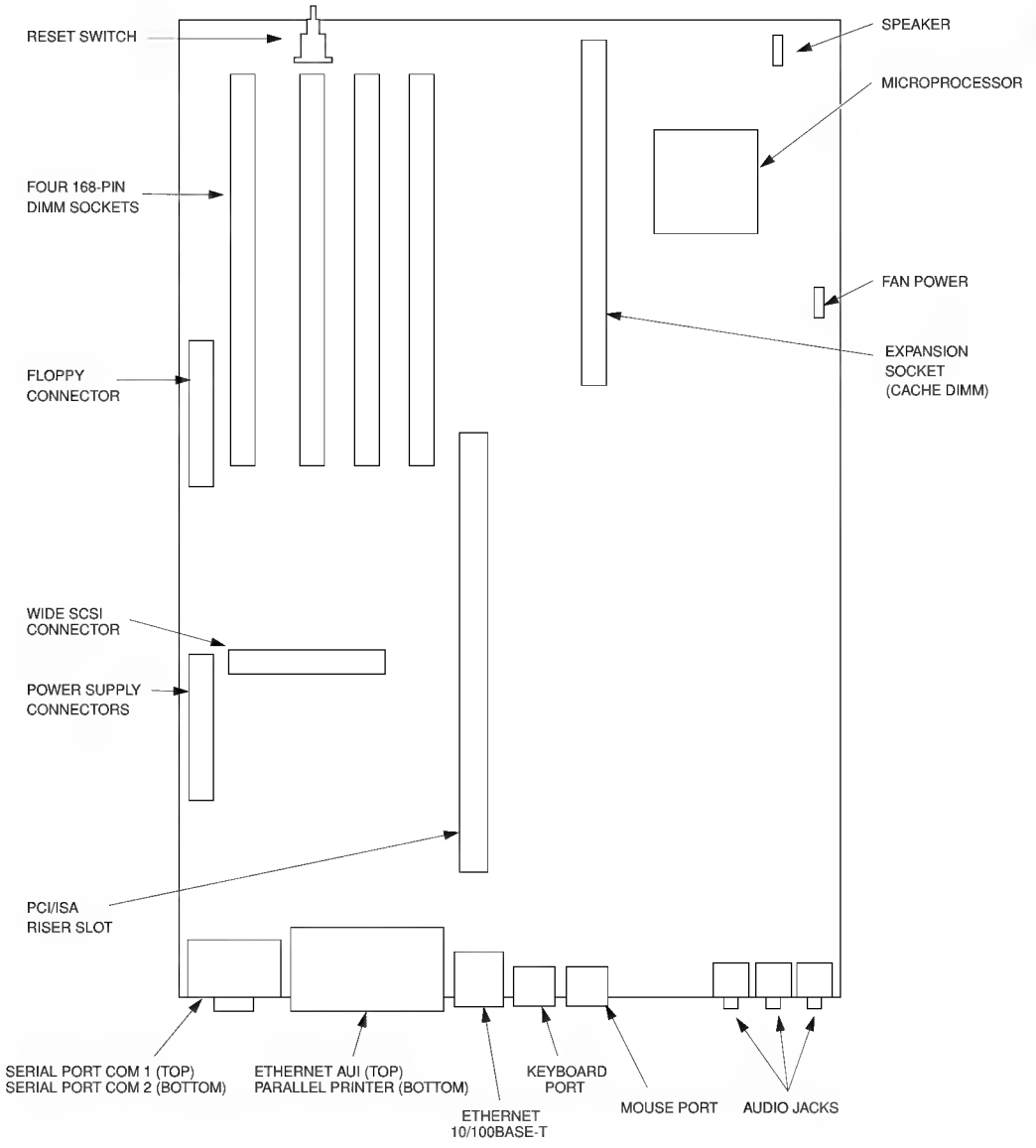
System Motherboard

The motherboard is a single-board computer containing the microprocessor, main memory DIMM and L2 cache slots, interfaces for SCSI, serial I/O, and keyboard and mouse ports. The illustration on the next page shows the layout of the motherboard.

These are some of the major features of the motherboard:

- 603e-166 MHz or 604e-200MHz PowerPC microprocessor
- Second-level cache DIMM socket
- Four 168-pin DIMM sockets
- 2 PCI, one shared PCI/ISA, and two ISA expansion slots
- Two DB9 connectors for asynchronous serial connections
- One DB25 connector (bidirectional) for a parallel printer
- 68-pin SCSI connector supporting fast/wide SCSI-2 data transfer
- Two Ethernet connectors for data exchanges with other systems on a Local Area Network (LAN)
  One or the other may be used (depending on the nature of the network cabling), but not both.
  - A DB15 connector labeled ETHERNET for an AUI port
  - A RJ45 connector labeled 10/100BaseT for a twisted-pair Ethernet port
- PS/2 keyboard and PS/2 mouse ports
- Three 3.5mm audio jacks for headphone and microphone connections (LINE OUT is used for headphones or self-powered speakers)
- Low/high-density floppy disk controller

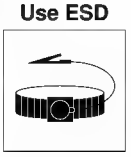

RESET SWITCH
SPEAKER
MICROPROCESSOR
FOUR 168-PIN
DIMM SOCKETS
FAN POWER
EXPANSION
SOCKET
(CACHE DIMM)
FLOPPY
CONNECTOR
WIDE SCSI
CONNECTOR
POWER SUPPLY
CONNECTORS
PCI/ISA
RISER SLOT
SERIAL PORT COM 1 (TOP)
SERIAL PORT COM 2 (BOTTOM)
ETHERNET AUI (TOP)
PARALLEL PRINTER (BOTTOM)
ETHERNET
10/100BASE-T
KEYBOARD
PORT
MOUSE PORT
AUDIO JACKS

Installing Your System 3

In this section, you will find the following information:

- Following ESD and Safety Procedures, page 3-2
- Setting the Power Supply Voltage, page 3-3
- Connecting the System, page 3-4
- Powering Up the System, page 3-6
- Installation Troubleshooting, page 3-8
- Loading and Unloading Removable Drive Media, page 3-9
- Cleaning and Preventative Maintenance, page 3-12

Following ESD and Safety Procedures



Motorola strongly recommends that you use an antistatic wrist strap and a conductive foam pad when installing or upgrading the system. Electronic components, such as disk drives, computer boards, and memory modules, can be extremely sensitive to ESD. After removing the component from the computer or its protective wrapper, place the component flat on a grounded, static-free surface, and in the case of a board, component-side up. Do not slide the component over any surface.

If an ESD station is not available, you can avoid damage resulting from ESD by wearing an antistatic wrist strap (available at electronics stores). Wrap one end of a wrist grounding strap around your wrist.

Attach the grounding end (usually a piece of copper foil or an alligator clip) to an electrical ground. An electrical ground can be a piece of metal that literally runs into the ground (such as an unpainted metal pipe) or a metal part of a grounded electrical appliance. An appliance is grounded if it has a three-prong plug and is plugged into a three-prong grounded outlet. You cannot use the computer itself as a ground, because it is unplugged when you work on it.

Warning

Turn the system's power off before you perform these procedures. Failure to turn the power off before opening the computer can result in personal injury or equipment damage. Hazardous voltage, current, and energy levels are present in this product. Power switch terminals can have hazardous voltages present even when the power switch is off. Do not operate the computer with the cover removed. Always replace the cover before turning on the computer.

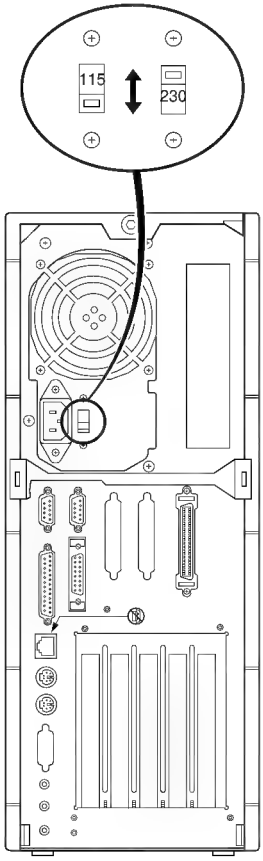
Setting the Power Supply Voltage

A switch on the rear panel can be used to set the power supply at:

- 115V AC (in the range of 90-132 VAC) 60 Hz
- 230V AC (in the range of 180-264 VAC) 50 Hz

Caution

Before powering on the computer, check the switch to ensure the correct voltage for your location is set.



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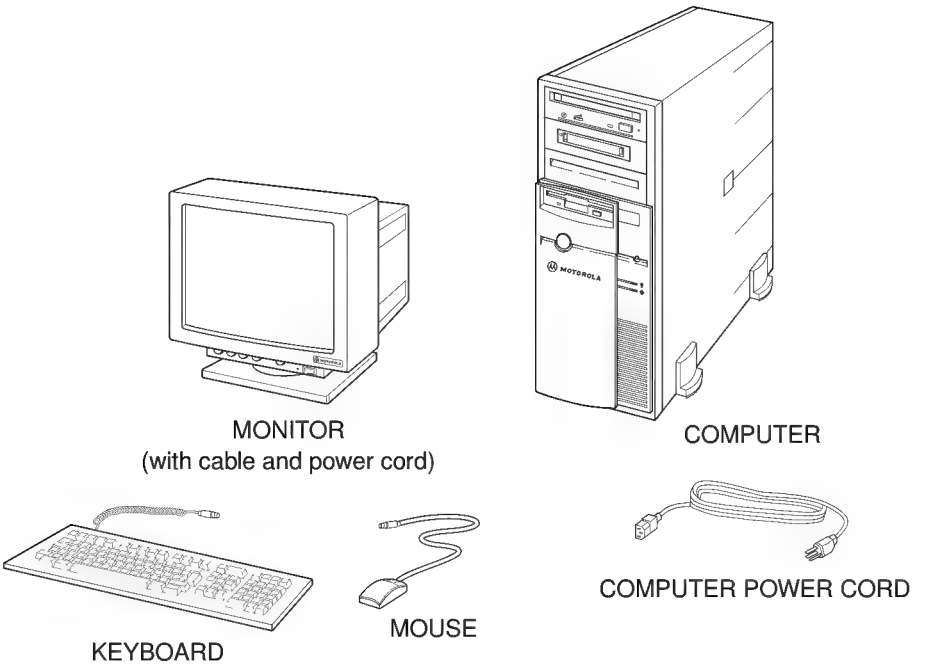
Connecting the System

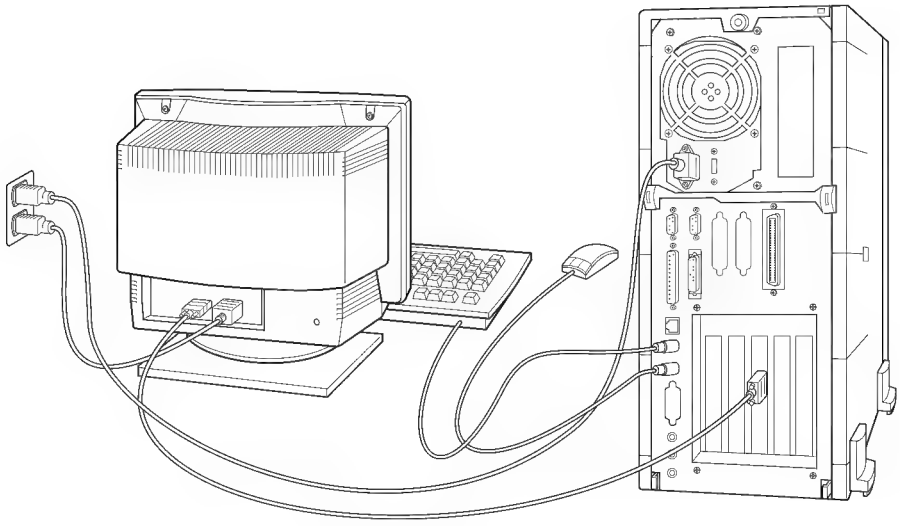


Before you begin to connect the equipment, make sure the line voltage selector on the back panel is set correctly for your location.

1. Plug the socket end of the computer's power cord into the AC inlet on the rear of the computer.
2. Connect the socket end of the monitor's power cord into the connector on the back of the monitor.
3. Connect one end of the monitor (video) cable into the port on the monitor (not necessary if your monitor comes with the cable attached).

   Plug the other end of the video cable into the port on the graphics (video) card.

4. Connect the keyboard and mouse cables into their ports on the rear of the computer.
5. Plug all power cords into a grounded, surge-protected power source.



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Powering Up the System

Note For proper cooling of the computer and for safety reasons, the cover should always be installed before you power up the computer. It must remain in place during system operation.

To start up your computer:

1. Ensure the voltage switch (on the back of the computer) is set to the correct voltage for your location.
2. Turn on the monitor.
3. Turn on any peripherals attached to the computer.
4. Push and release the power switch on the front of the computer. The power light on the front of the computer illuminates, and the indicator lights on the keyboard flash.

In a few seconds, you will now see a series of messages about the:

- memory size
- processor
- firmware version
- MPU speed
- memory bus speed

The system performs self tests to verify that all its internal components are in working order. The system then begins to initialize the firmware.

The next screen you see is the autoboot screen. It is at this point that you can halt the boot sequence. If you do halt autoboot, you will be brought to the firmware level. Depending on the operating system you are running, your screen will display a firmware screen with a set of options.

If you do not halt autoboot, autoboot proceeds and begins to load the operating system.

Once the operating system finishes booting, a start-up screen and a login dialog box appear. What appears on your screen depends on the operating system that is loaded. You can now consult your operating system manuals and release notes for instructions on logging in and setting up your operating environment.

This is a good time to adjust the brightness and contrast on your monitor if the screen display appears dim.

Configuring Keyboard Options

PowerPC Open Firmware International Keyboard Selection

PowerPC Open Firmware provides support for the United States and some European-style keyboards.

To modify the international keyboard, use the keyboard or mouse to:

1. Select **Advanced Options.**
2. Select the **Configure Keyboard Options**.

   A submenu displays listing the supported keyboard styles.
3. Using the Up/Down arrow keys or the mouse, select the language.

The selected country's keyboard is immediately activated and remains as the set variable whenever the system is powered up.

Firmware Documentation

For detailed information on PowerPC Open Firmware (for AIX® users):

- *PPC Open Firmware Quick Start*, part number PPCOFWQSA/UG*x*
- *PPC Open Firmware User's Manual*, Volume 1, part number PPCOFWA1/UM*x* and Volume 2, part number PPCOFWA2/UM*x*

Installation Troubleshooting

Use this next table to solve some basic problems that may occur after installing the system. Refer to your firmware documentation for resolution of any problems occurring during system start-up. Refer to your operating system documentation for resolution of any problems occurring after system boot.

Table 3-1. Troubleshooting Guide

IF this occurs . . .	THEN . . .
Green "power-on" LED fails to light.	Ensure that AC cable is connected tightly.
Disk drive does not respond.	Ensure that disk drive cables are firmly seated into their connectors.
SVGA terminal: No output to terminal Split screen output Distorted display	You are using the wrong cable or are using an unsupported monitor resolution.

Loading and Unloading Removable Drive Media

Note To avoid damaging the data on the disk or tape, insert the media only after powering up the system and remove it before powering down. Do not touch any of the disk or tape surfaces that may be momentarily exposed.

Floppy Disk or Cassette Tape

To load a floppy disk or cassette tape:

1. Make sure the system is powered up.
2. Slide the floppy disk or tape into the drive, label up and arrow forward. When the media is well into the drive, it engages a mechanism that pulls it the rest of the way in and locks it into place.

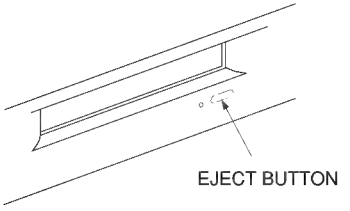
To eject a floppy disk or cassette tape:

1. Press the button on the drive to release the media.
2. Pull the floppy disk or cassette tape out of the drive.

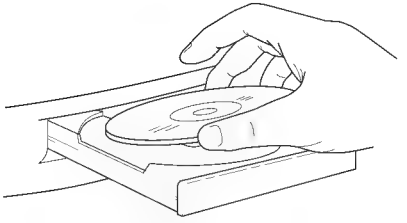
Loading and Unloading a CD-ROM Disc

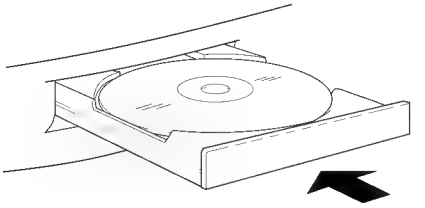
To load a CD-ROM disc:

1. Make sure the system is powered up.
2. Press the eject button on the front of the drive. The tray opens.



3. Place a CD-ROM disc in the tray, with the label facing up. Make sure the disc is lying flat and centered in the tray.
   Push the tray in until it closes or push the eject button.

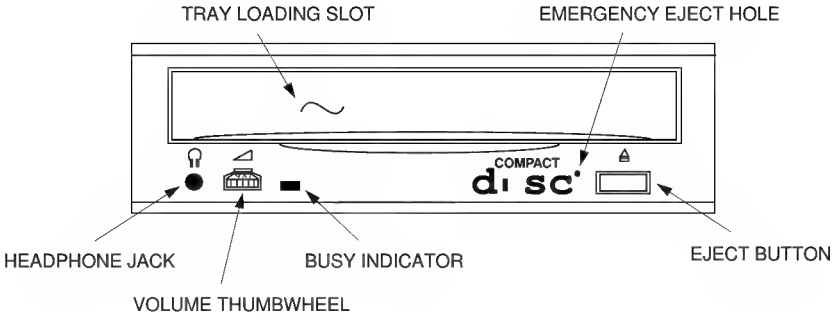




To eject the CD-ROM disc:

1. Press the eject button on the front of the drive.
2. The carrier opens. Lift the disc out of the carrier and return it to its original container.

CD-ROM Front Panel



Cleaning and Preventative Maintenance

If the housing of the computer needs cleaning, spray a small amount of a mild household cleaner on a clean, soft, cotton cloth and gently wipe the surfaces. To avoid getting any liquid into the computer's operating mechanisms, do not spray cleaner directly on the cabinet. For printers, terminals, or other peripherals, refer to the equipment's user manual for cleaning instructions.

Tape Drive Maintenance

Cartridge tape drives should be cleaned after every eight hours of use.

To prevent loss of data or damage to the cartridge tapes, store them in a protected location which meets the following requirements:

- No direct sunlight
- No sources of magnetization
- No dust
- Temperature range from 50° to 104° F (10° to 40° C), or as stated on the cartridge cover (may vary from one manufacturer to another)
  Try to place the cartridge tapes in the middle of this temperature range for best storage results.
- Relative humidity range from 8% to 80%
  The best storage humidity environment is at the middle of this range.
- To prevent damage to data on the cartridge tapes, avoid touching the exposed surfaces or breaking open the protective coverings on the media

Taking Your System Apart

4

In this section, you will find instructions on how to perform these tasks:

- Removing the Cover, Front Bezel, and Bottom Panel, page 4-4
- Replacing the Cover, Front Bezel, and Bottom Panel, page 4-7
- Removing the Riser Card Assembly, page 4-8
- Replacing the Riser Card Assembly, page 4-10
- Removing the Motherboard, page 4-11
- Installing the Motherboard, page 4-17
- Removing the Power Supply, page 4-22
- Installing the Power Supply, page 4-27

Before You Disassemble the System

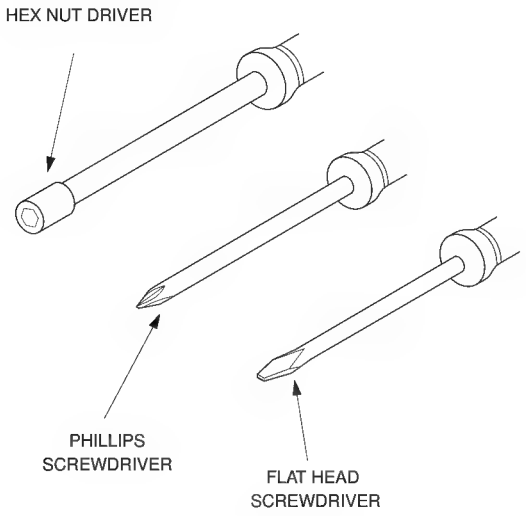
Before you begin to perform any system upgrade or maintenance task, please adhere to the following recommendations.

- Do not operate the computer with the cover removed. Always replace the cover before powering on the system.
- Before removing the computer's cover: (1) perform an operating system shutdown; and (2) power off the system.
- Turn off all peripheral devices connected to the computer. Put identification tags on all cables. Disconnect cables from the computer, including the AC power cord from its outlet.

Tools You Need

You need the following tools to disassemble the computer:

- 1/8-inch flat head screwdriver
- Number one Phillips screwdriver
- 3/16-inch hex nut driver (used for removing motherboard)
- 5/16-inch hex nut driver (used for removing motherboard)



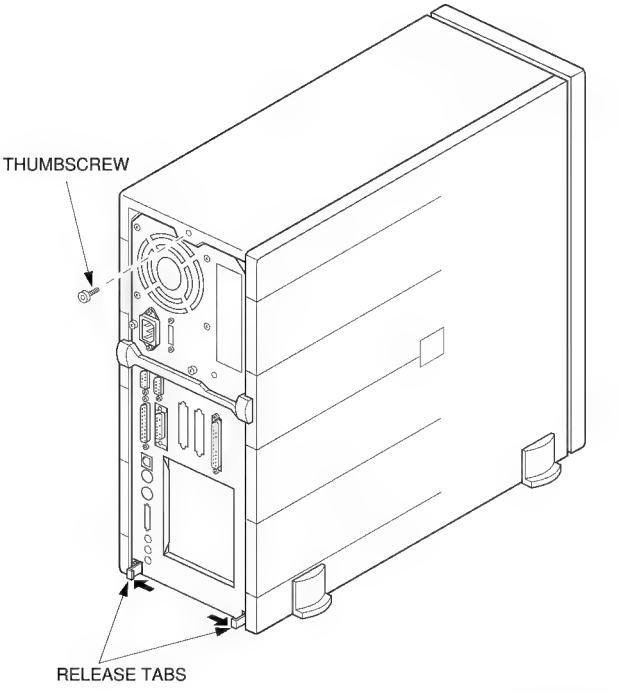
Removing the Cover, Front Bezel, and Bottom Panel

You need a Phillips screwdriver to remove the bottom panel.

Use ESD

Wrist Strap

1. Turn off power to the system, and keep it off until you replace the cover.
2. Remove the thumbscrew located at the top, rear edge of the enclosure.
3. Facing the rear of the system, place your thumbs on either side of the release tabs on the cover and pull outward and then forward. The cover should release from the chassis.



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4. Still grasping the outer edges of the cover, pull the cover forward until it is completely free of the chassis.

Removing the Front Bezel

5. To remove the front bezel, face the front of the chassis.

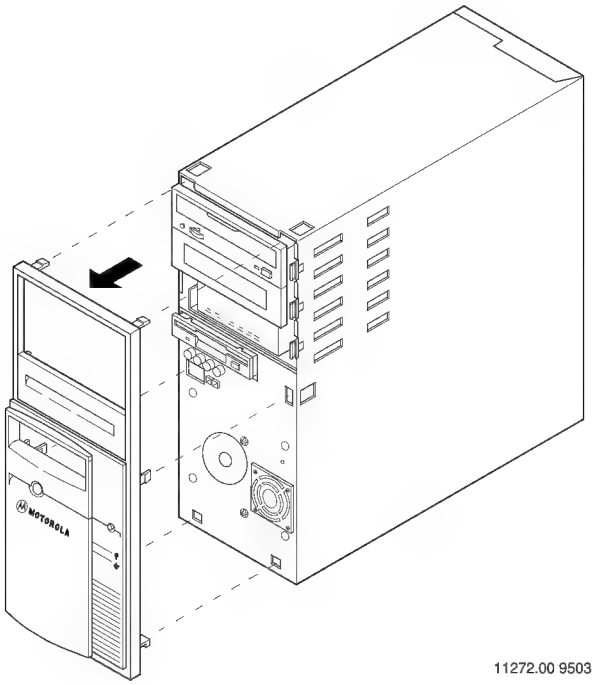
   Locate the release tabs on the top of the bezel. Press down on the tabs until they clear the openings in the chassis.

6. There are release tabs on the right and back left side of the bezel. Press inward on these tabs to release the top of the bezel.

   Grasp the bezel and pull toward you until the clips at the bottom release.

Caution

The speaker is now exposed on the front of the chassis. The speaker is fragile and can be easily damaged.



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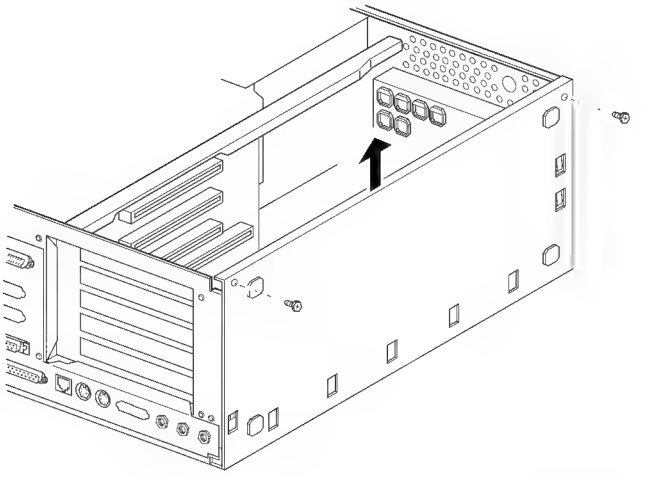
Removing the Bottom Panel

7. For easier accessibility, remove the metal panel on the bottom of the chassis. The panel is attached to the chassis with two screws.

   Position the chassis on its side and remove the two screws on the panel. Grasp each end of the panel and pull up until the panel releases from the support clips on the chassis.



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Replacing the Cover, Front Bezel, and Bottom Panel

You need a Phillips screwdriver to replace the bottom panel.

Replacing the Bottom Panel

1. Place the chassis on its side. Replace the bottom panel by sliding the clips on the panel over the edge of the chassis.

   Secure the panel with two screws.

Replacing the Front Bezel

2. Stand the chassis upright and face the front of the chassis. Insert the clips on the bottom of the bezel into the openings on the bottom of the chassis.
3. Snap the bezel to the front of the chassis, making sure the drive devices fit through the slots in the bezel.

Replacing the Cover

4. Face the rear of the chassis. Note the two tabs located on the bottom of the cover. These tabs must fit into the openings on the rear of the chassis. Also note that two inserts are on the inside of the cover. These inserts must fit over the edge of the chassis.
5. Holding the sides of the cover, slide the cover from the top and down over the chassis toward the front until the tabs snap into place. The edges of the cover must fit under the edges of the bezel.
6. Insert the thumbscrew into the cover at the rear of the chassis.

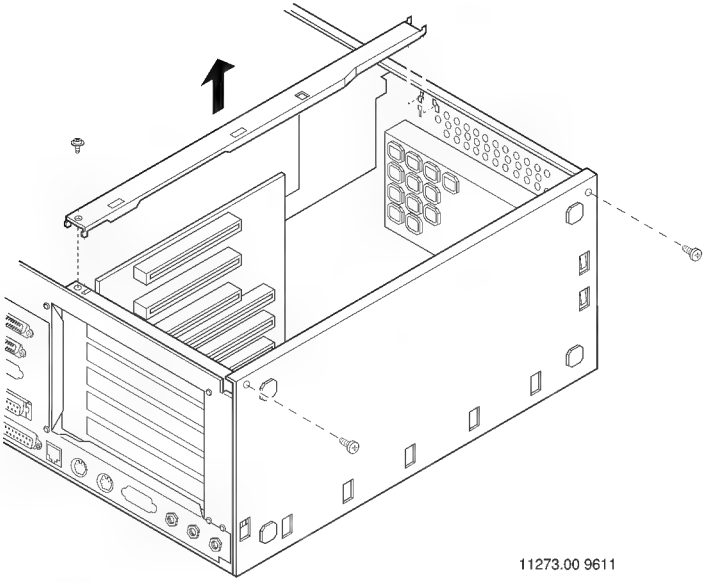
Removing the Riser Card Assembly

Use the following steps to remove the riser card. You need a Phillips screwdriver for this procedure.

Use ESD

Wrist Strap

1. Perform an operating system shutdown. Turn power off to the system.
2. Remove the system cover. Turn the system on its side. Remove the bottom panel.
3. Disconnect cables attached to expansion cards installed in the riser card. Remove the screw securing the expansion card to the chassis and then pull the card out of its connector on the riser card. Do this for each installed card.
4. Remove the chassis support bar located on top of the riser card. The support bar is secured with a screw. After removing the screw, grasp the bottom edge of the bar and pull outward to release it from the clip. Lift the bar up and out.



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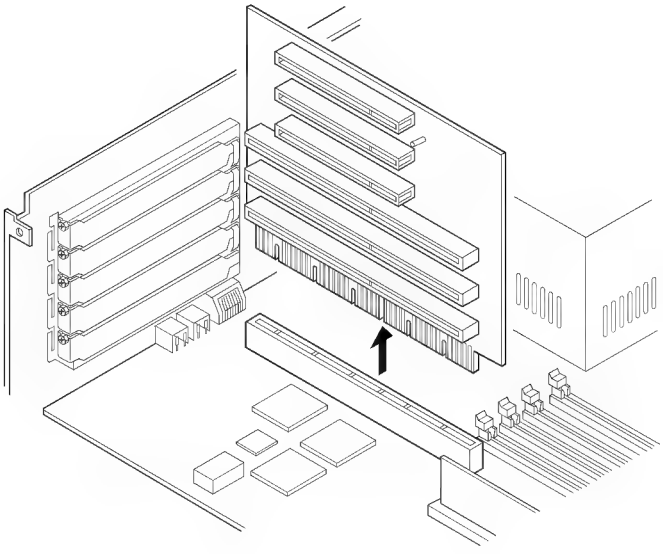
5. Remove the riser card by pulling up on one end and then the other end until it releases from its connector on the motherboard.



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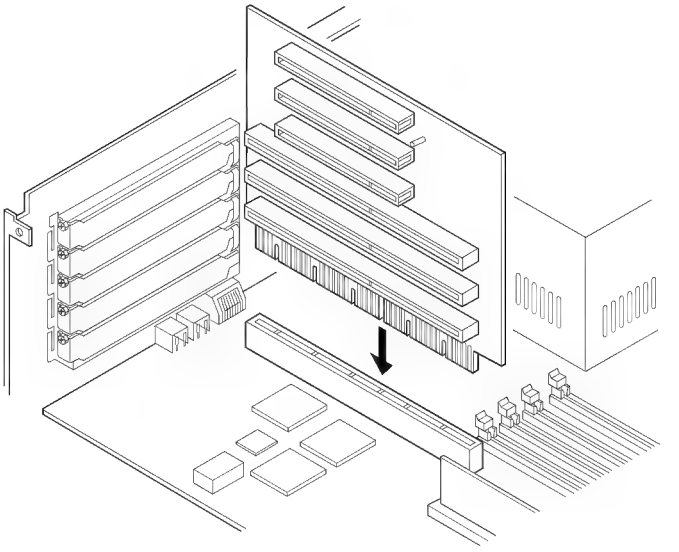
Replacing the Riser Card Assembly

Use the following steps to replace the riser card. You need a Phillips screwdriver for this procedure.

1. Install the riser card by lining up the guide tabs on the connectors and gently pushing the card down and then once again to seat it.



11602.00 9610

2. Install any expansion cards and cables you removed.
3. Attach the chassis support bar to the top of the riser card. Insert the end of the bar into the chassis, making sure that the metal guides are seated properly over the top of the card. Snap the front end of the bar in place and insert the screw to secure the bar.
4. Replace the bottom panel and the cover.
5. Power the system on.

Removing the Motherboard

Use the following steps to remove the motherboard. You need a Phillips screwdriver, a slotted screwdriver, and two nut drivers for this procedure.

Caution

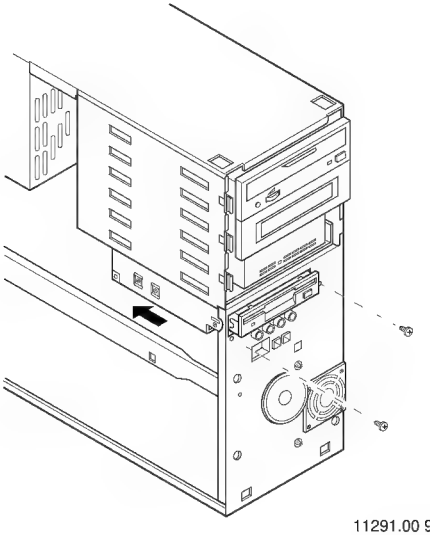
When you disconnect cables, do not allow them to touch the motherboard.

Use ESD

Wrist Strap

1. Perform an operating system shutdown. Turn power off to the system. Disconnect all cables attached to the rear panel of the system.
2. Remove the system cover and the front bezel.
3. To make it easier to remove the motherboard, remove the floppy drive. Disconnect the floppy drive's power and drive cables.
4. Remove the floppy drive by first removing the two screws in the front of the chassis.

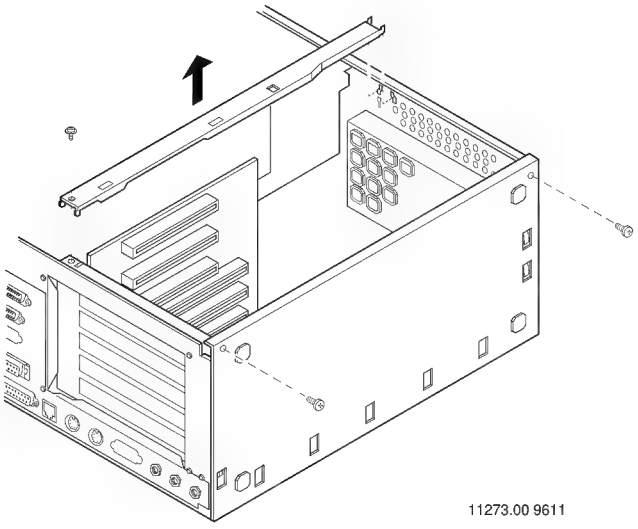
Grasp the assembly from the bottom with one hand, and pressing against the front of the drive with the other hand, slide the floppy assembly toward the rear of the chassis until it releases from the drive bay. Lift it up and out of chassis.



11291.00 9503

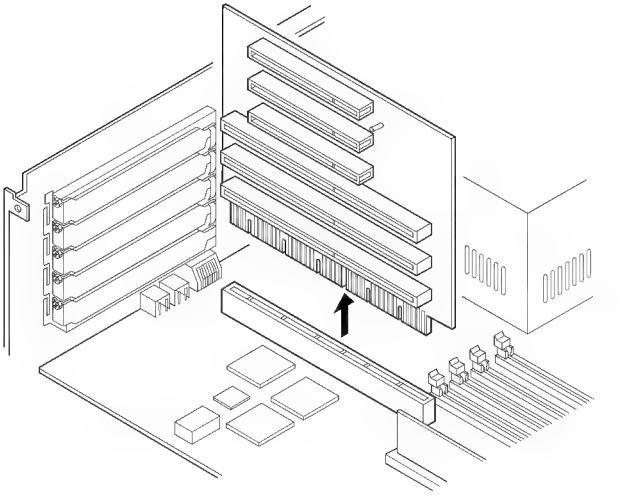
5. Lay the chassis on its side, and remove the metal bottom panel. Remove the two screws that hold the panel to the chassis. Grasp each end of the panel and pull upward until it releases from the support clips on the chassis.

6. Remove the chassis support bar located on top of the riser card. The support bar is secured with a screw. After removing the screw, grasp the bottom edge of the bar and pull outward to release it from the clip. Lift the bar up and out.



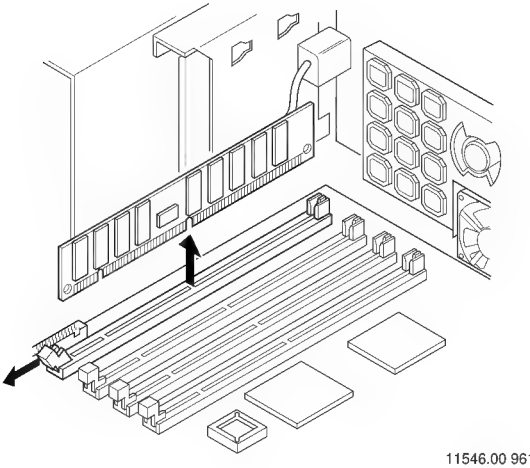
7. Disconnect the CD-ROM audio cable from the motherboard.
8. Disconnect the floppy and SCSI drive cables from their connectors on the motherboard.
9. Disconnect the speaker and fan cables from the motherboard.
10. Disconnect cables attached to any installed expansion cards. Remove the expansion cards from the riser card.

11. Remove the riser card by pulling up on one end and then the other end until it releases from its connector on the motherboard.



11602.00 9610

12. Remove any DIMMs. Press open the retaining clip at the end of the DIMM. Lift up on the DIMM until it is free from the socket. Store it in an antistatic package.

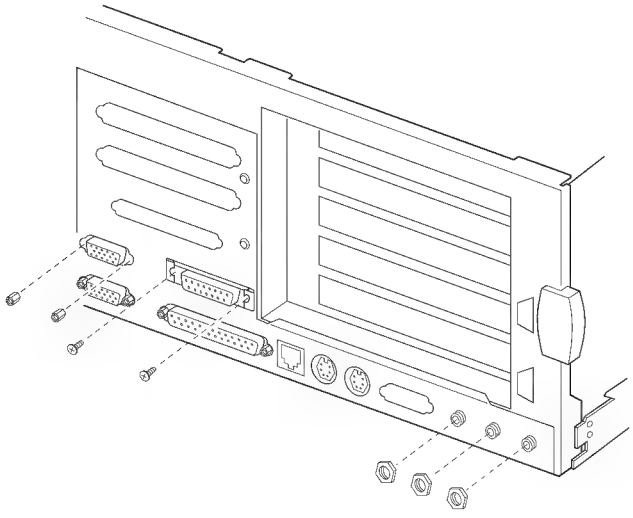


11546.00 9610

13. If an L2 cache DIMM is installed, remove it. Hold it on opposite ends with both hands and pull up on it while rocking it from side to side. Continue until the cache comes out of the socket. Store it in an antistatic protective wrapper.

14. Disconnect the two six-pin power supply cables. Note the connector location of each.

15. Remove the hex nuts from the COM one, the Line In, Mic In, and Line Out ports. Remove the slide lock from the Ethernet port.

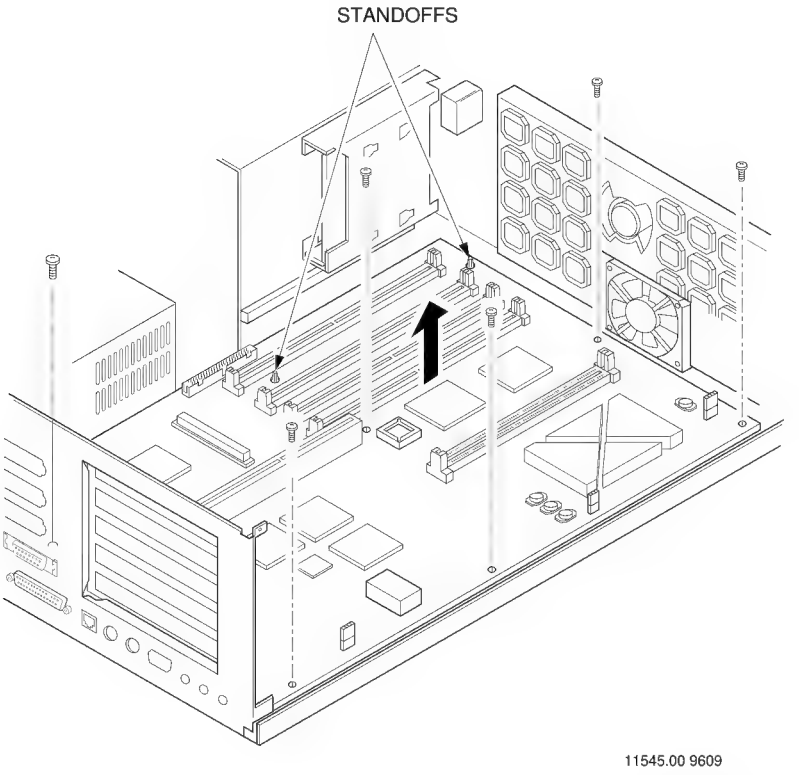


11257.00 9502

16. Remove the two flat head screws which secure the SCSI cable to the rear of the chassis. Note which end of the cable attached to the external connector. The cable must be reconnected the same way.

    Remove the SCSI terminator to gain access to the screws.

17. Remove the six screws securing the motherboard to the chassis.



18. Facing the front of the chassis, grasp the motherboard at the end farthest from you and lift up to unsnap it from the standoff. Unsnap the motherboard from the second standoff.

19. Tilt the motherboard as you slide it away from you until the connectors clear the rear chassis panel. Lift the board out of the chassis being careful to avoid the light pipes and reset switch.

20. Place the board in an antistatic protective wrapper. You can now install the new motherboard.

Installing the Motherboard

Use the following steps to install the motherboard. Use a Phillips screwdriver and two nut drivers for this procedure.

Caution

When you disconnect cables, do not allow them to touch the motherboard.

Use ESD

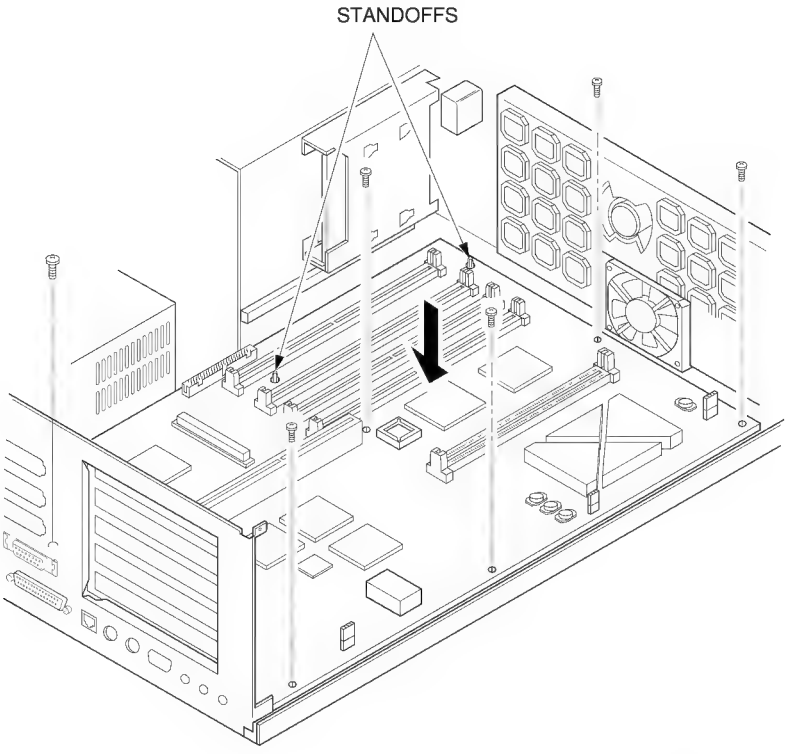
Wrist Strap

1. Remove the new motherboard from its packaging.
2. Face the rear of the chassis and tilt the motherboard slightly and lower it into the chassis.

   Slide the board toward you and line up the connectors with the openings in the rear panel.
3. Seat the board, making sure the two standoffs protrude through the openings on the motherboard.

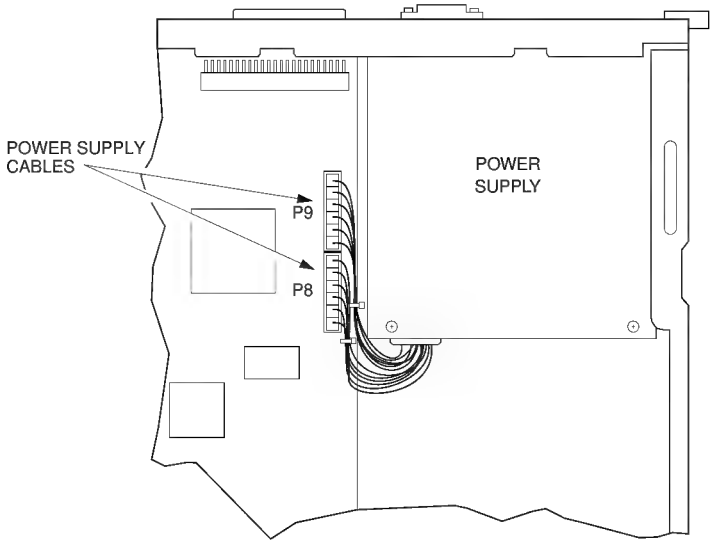
   Gently press the board down at the edges and snap into place on each standoff.

4. Install the six original screws.



5. Replace the hex nuts from the COM one, the Line In, Mic In, and Line Out ports. Replace the slide lock on the Ethernet port. Replace the SCSI cable connector and secure with two screws. If used, replace the SCSI terminator.

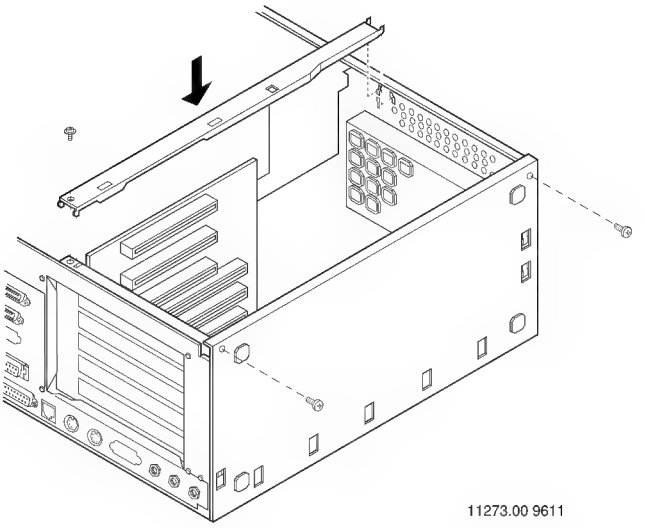
6. Plug the power connectors labeled P8 and P9 into their connectors on the motherboard.



7. Install the L2 cache DIMM and memory DIMMs.
8. Attach the floppy cable to its connector on the motherboard.
   Attach the SCSI cable to the SCSI connector on the motherboard.
9. Install the riser card. Line up the guide tabs on the connectors and gently push the card down and then again to seat it.
10. Install any expansion cards you removed. Connect their cables.
11. Connect the speaker and fan cables.
    Connect the CD-ROM audio cable to the motherboard.

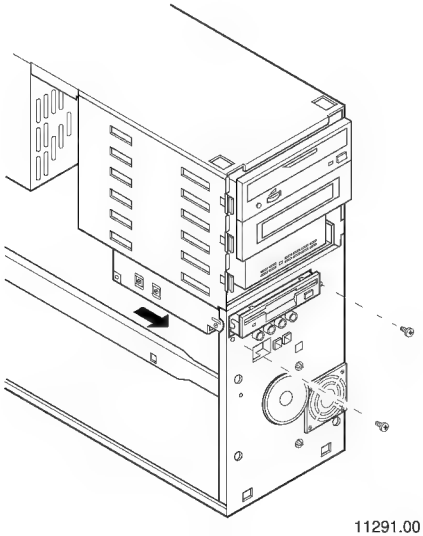
12. Attach the chassis support bar to the top of the riser card. Insert the end of the bar into the chassis, making sure the metal guides are seated properly over the top of the card. Snap the front end of the bar in place and insert the screw to secure the bar.

13. Replace the metal bottom panel. Insert the two screws on the panel and tighten securely.



14. Turn the chassis upright. Insert the floppy drive assembly from behind the front panel, making sure the clips on the top of the carrier protrude through slots in the compartment above.

    Secure the drive assembly to the chassis with two screws.



11291.00 9503

15. Attach the remaining end of the floppy cable to the connector on the rear of the drive.

    Attach the four-pin power cable coming from the power supply to the rear of the floppy drive.

16. Replace the bezel and the cover.

17. Attach all cables to the rear panel.

18. Power the system on.

Removing the Power Supply

Use these steps to remove the power supply assembly. You need a Phillips screwdriver for this procedure.

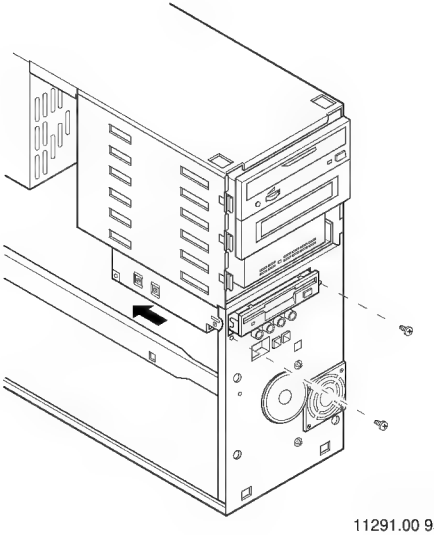
Use ESD

Wrist Strap

1. Perform an operating system shutdown. Turn off power to the system.
2. Remove the system's cover and front bezel.
3. In order to remove the power switch and cord, it is necessary to remove the floppy drive.

   Disconnect the floppy power and drive cables.
4. Remove the floppy drive by first removing the two screws in the front of the chassis.

   Grasp the assembly from the bottom with one hand, and pressing against the front of the drive with the other hand, slide the floppy assembly toward the rear of the chassis until it releases from the drive bay. Lift it up and out of chassis.



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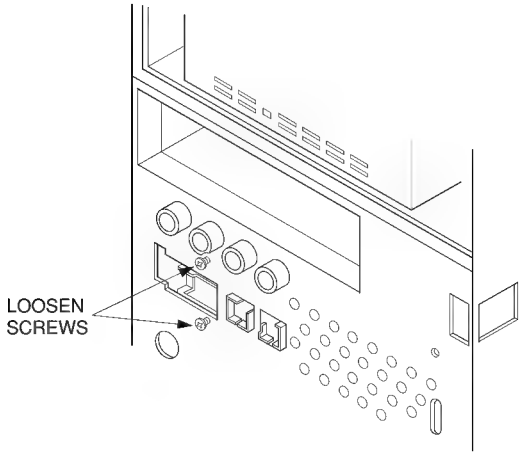
5. To disconnect the power cord from the switch, grasp the power switch with one hand and loosen the two screws located on the sides of the power switch.



11299.00 9610 (2-2)

Pass the power switch and cord through the floppy drive opening in the front panel. This keeps it away from the motherboard as you perform the next step.

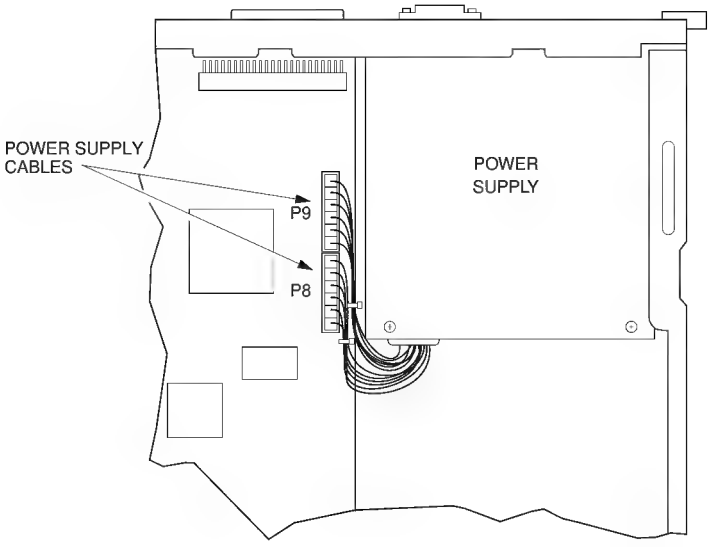
Lay the chassis on its side.

6. Remove the cord shield attached to the bottom of the SCSI compartment. Grasp the shield and slide it toward the rear of the chassis until the shield tabs release.

   Pull the shield away from the panel and separate it from the power cord. Set it aside.

   Pull the cord and switch back through the chassis opening.

7. Disconnect the P8 and P9 power supply cables.

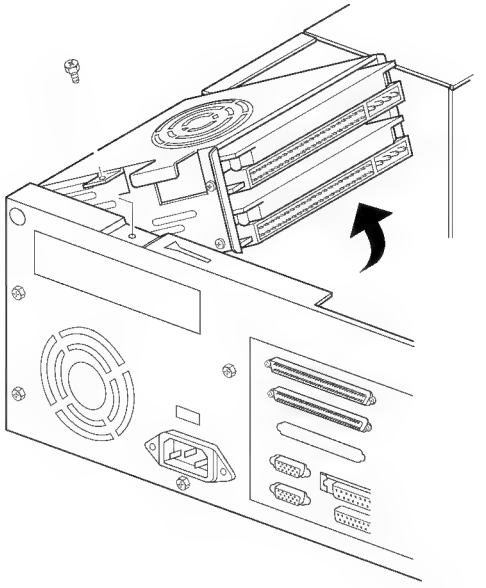


11251.00 9501

8. Face the rear of the chassis. Disconnect the SCSI cables and power cables from any installed drives in the rear drive bay (internal drive bays). If you are having difficulties disconnecting these cables from the drives, it might be necessary to remove the support bar and the riser card.

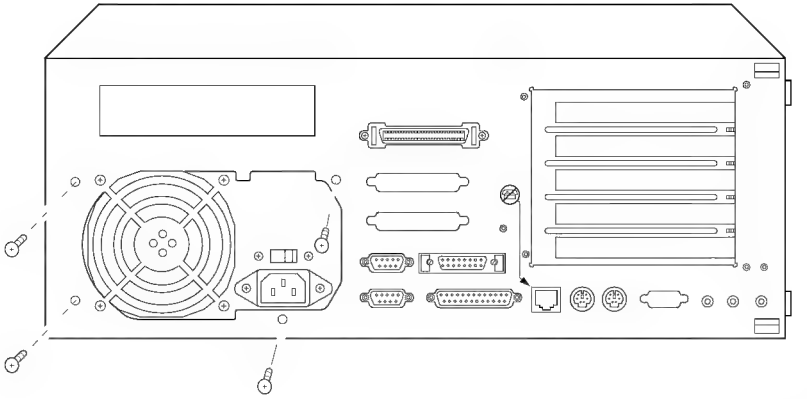
9. Disconnect the power cables from any installed drives in the front drive bays. Disconnect the SCSI cables for extra space to manipulate the power supply.
10. Remove the screw from the drive cage. Swing the cage up and out.

Note Do not allow the drive cage to drop down into the chassis.



11295.00 9503

11. Remove the four screws connecting the power supply to the back chassis panel. Set the screws aside.



11634.00 9610

12. Push the power supply inward and lift up to remove it out of the chassis.

Installing the Power Supply

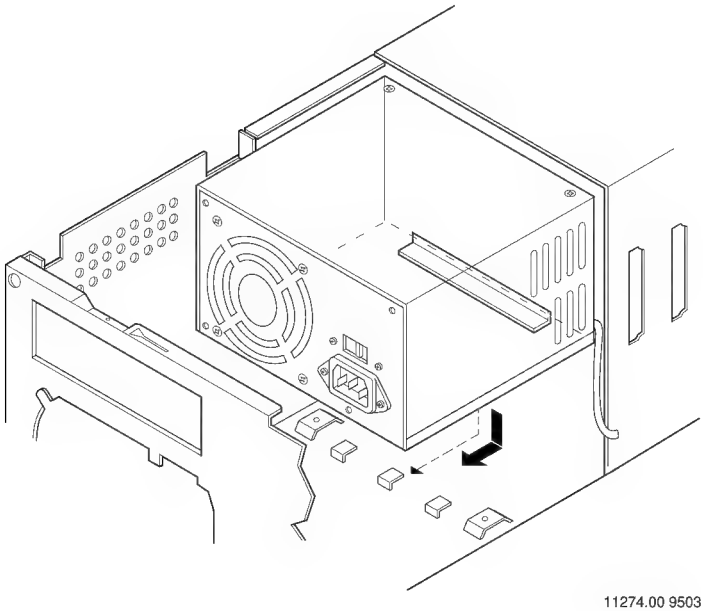
Use these steps to install the power supply assembly. You need a Phillips screwdriver for this procedure.

Use ESD

Wrist Strap

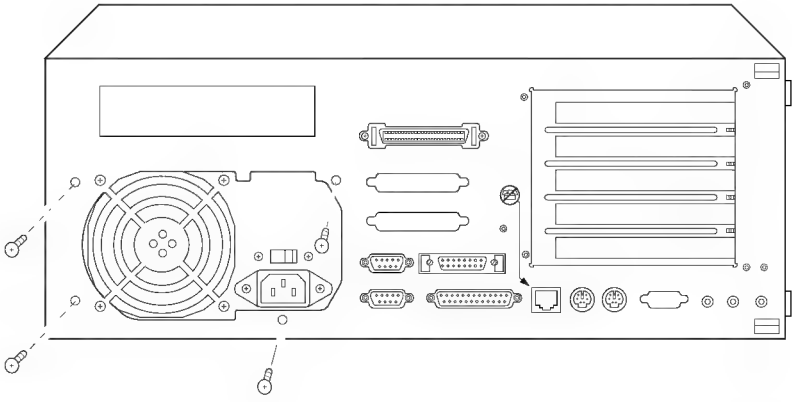
1. Face the rear of the chassis. Turn the power supply over and note the clip on the bottom of the supply. This clip fits into the tabs on the bottom of the chassis.

   Lower the power supply into the chassis and slide the supply toward the rear of the chassis.



11274.00 9503

2. Attach the supply to the rear chassis panel with four screws.



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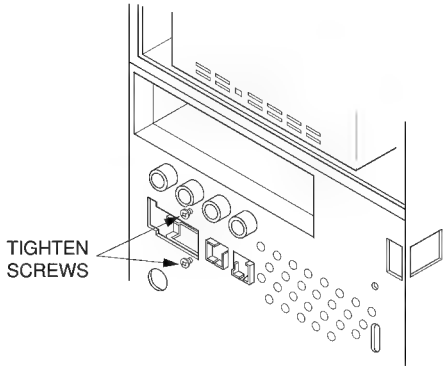
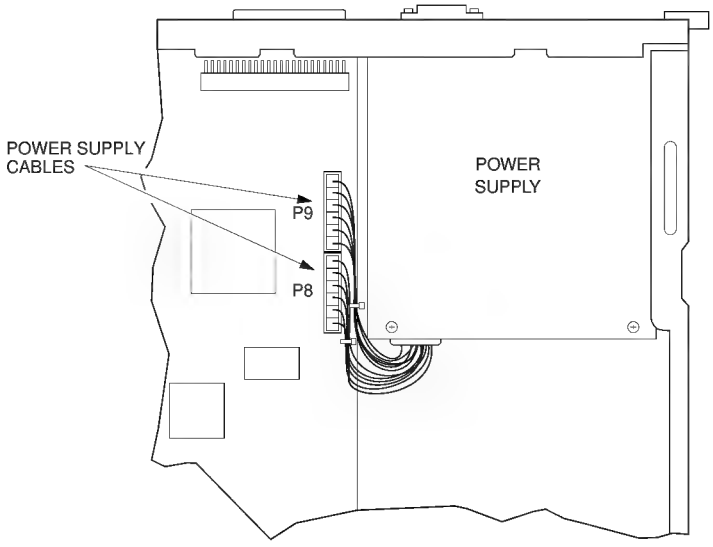
3. Attach the power connectors and SCSI connectors (if removed) to the drives in the front bays (external drive bays).
4. Lower the rear drive cage back inside the chassis. Line up the latch so it passes through the slot in the chassis. Secure the drive cage with a screw.
5. Attach the SCSI and power cables to the drives in the rear bay (internal drive bays).
6. Insert the power switch cord into the cord shield. Position the shield tabs over the slots in the SCSI bay and slide until locked.

Position the power switch inside the chassis, aligning the metal tabs on each side of the switch over the screw slots in the chassis. Insert the two screws and tighten.



11299.00 9610 (2-2)

7. Connect the P8 and P9 power supply cables to their connectors on the motherboard.



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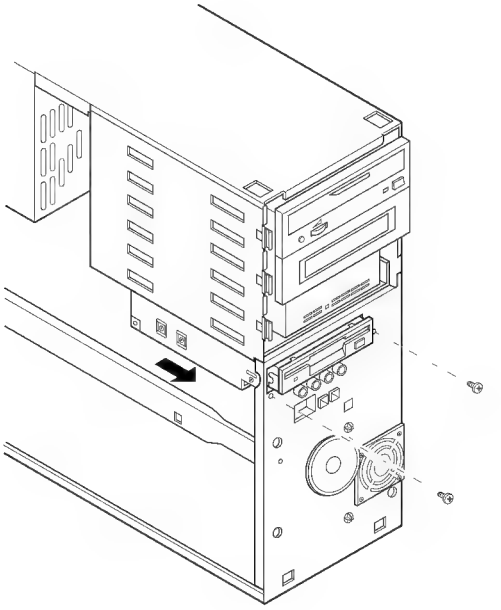
8. If removed, replace the riser card, any expansion cards, and the chassis support bar.

9. Replace the floppy drive.

   Turn the chassis upright. Insert the floppy drive assembly from behind the front panel, making sure the clips on the top of the carrier protrude through slots in the compartment above.

   Secure the drive assembly to the chassis with two screws. Attach the power and drive cables.



11291.00 9503

10. Replace the cover and front bezel.

11. Power the system on.

Installing System Options 5

In this section, you will find instructions on how to perform these tasks:

- Installing DIMMs, page 5-5
- Removing DIMMs, page 5-8
- Installing the L2 Cache DIMM, page 5-10
- Installing Expansion Cards, page 5-11

Before You Disassemble the System

Before you begin to perform any system upgrade or maintenance task, please adhere to the following recommendations.

- Do not operate the computer with the cover removed. Always replace the cover before powering on the system.
- Before removing the computer's cover: (1) perform an operating system shutdown; and (2) power off the system.
- Turn off all peripheral devices connected to the computer. Put identification tags on all cables. Disconnect cables from the computer, including the AC power cord from its outlet.

Memory Options

The motherboard contains sockets to install the following memory devices:

- Dynamic RAM: 168-pin DIMMs
- Level 2 Cache: 256KB async; 512KB and 1MB sync 182-pin DIMMs

The maximum amount of memory is 512MB. Different sized DIMMs may be combined, but they should be all the same speed and only those that have been specified for the system.

DIMM	Quantity	Memory Size
2M x 72	1	16MB
	2	32MB
	3	48MB
	4	64MB
4M x 72	1	32MB
	2	64MB
	3	96MB
	4	128MB
8M x 72	1	64MB
	2	128MB
	3	192MB
	4	256MB
16M x 72	1	128MB
	2	256MB
	3	384MB
	4	512MB

EDO and Non-EDO Memory

When your system is shipped from the factory, it is populated with one 32MB EDO DIMM. For optimum performance, it is recommended that this same type of DIMM be added.

After you install any type of memory, you should interrupt autoboot and access the firmware menu. This is to ensure that the system recognizes all of the installed memory.

Caution

If non-EDO memory is installed, system performance will be impacted.

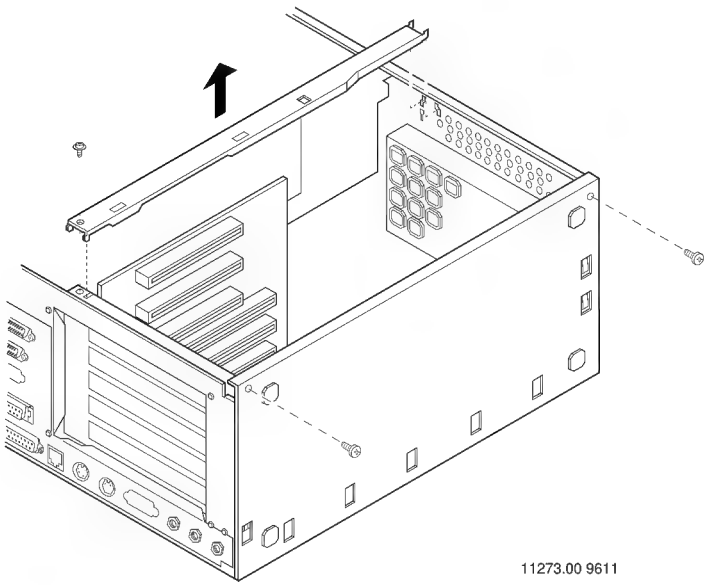
Installing DIMMs

Use the following steps to install DIMMs. You need a Phillips screwdriver to remove the bottom panel and the chassis support bar.

Use ESD

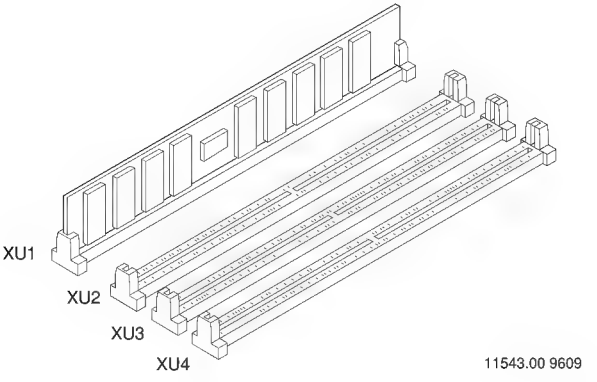
Wrist Strap

1. Perform an operating system shutdown. Turn off power to the system.
2. Remove the cover and lay the chassis on its side. For easier accessibility to the DIMM sockets, remove the bottom panel and the chassis support bar.

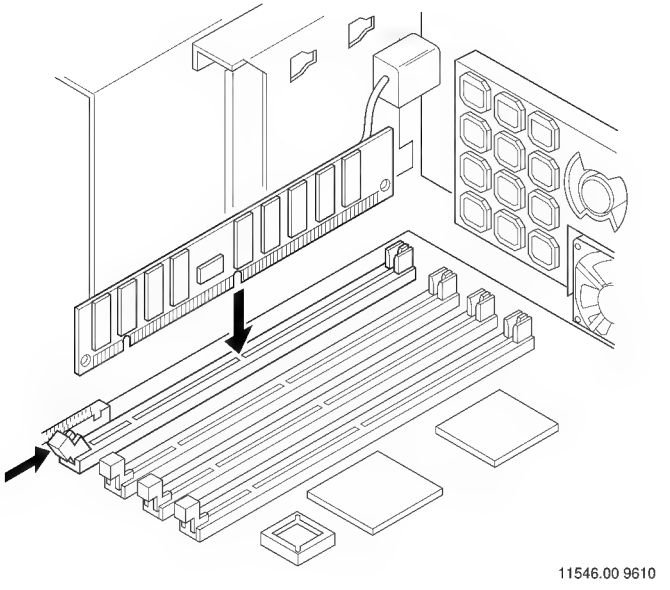


3. Remove the DIMM from its antistatic packaging.

4. Install DIMMs beginning with socket XU1, then fill sockets XU2, XU3, and XU4.



5. Position the DIMM into the slot, making sure that pin one on the DIMM is on the left. Push the DIMM into the memory socket until it is completely seated.



6. Install the chassis support bar and replace the bottom panel. Replace the cover.
7. Power on the system.

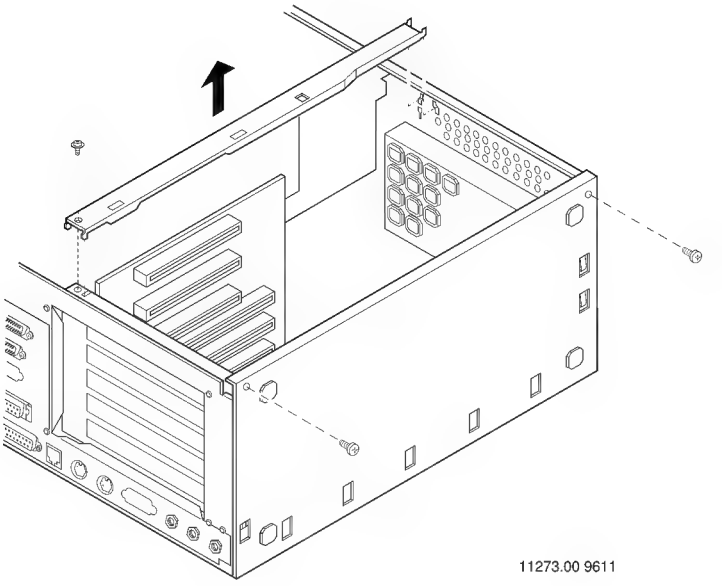
Removing DIMMs

Use the following steps to remove DIMMs from the motherboard. You need a Phillips screwdriver to remove the bottom panel.

Use ESD

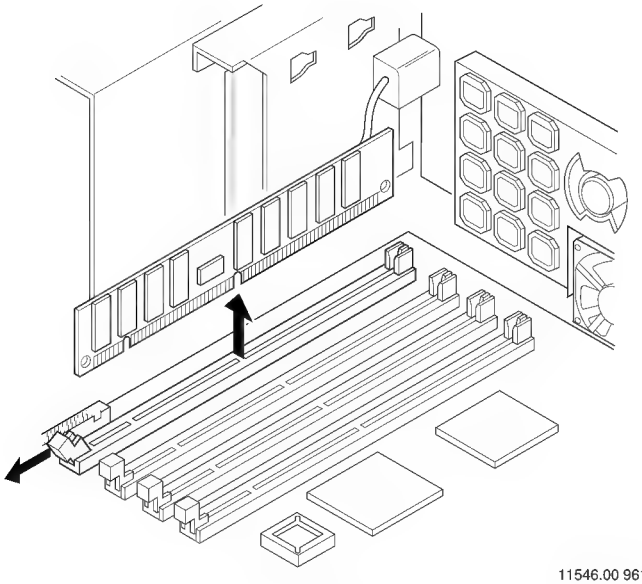
Wrist Strap

1. Perform an operating system shutdown. Turn off power to the system. Remove the enclosure cover.
2. Remove the cover and lay the chassis on its side. For easier accessibility to the DIMM sockets, remove the bottom panel and the chassis support bar.



11273.00 9611

3. Press open the retaining clip at the end of the DIMM. Lift up on the DIMM until it is free from the socket. Store it in an antistatic package.



11546.00 9610

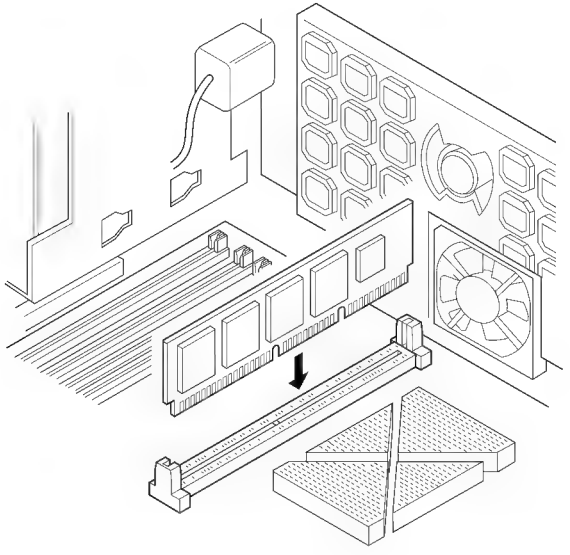
4. Install the chassis support bar and replace the bottom panel. Replace the cover.
5. Power on the system.

Installing the L2 Cache DIMM

Use the following steps to install the L2 cache DIMM. You need a Phillips screwdriver to remove the bottom panel.

1. Perform an operating system shutdown. Turn off power to the system. Remove the cover and lay the chassis on its side. For easier accessibility, remove the bottom panel.
2. Remove the cache from its antistatic packaging, handling it only by its edges.

   Locate the cache socket on the motherboard. Insert the DIMM and push down on it until the connector finger section completely descends into the slot.



11601.00 9610

Note To remove the cache DIMM, hold it on opposite ends with both hands and pull up on it while rocking it from side to side. Continue until the cache comes out of the socket.

3. Replace bottom panel and the cover. Power on the system.

Installing Expansion Cards

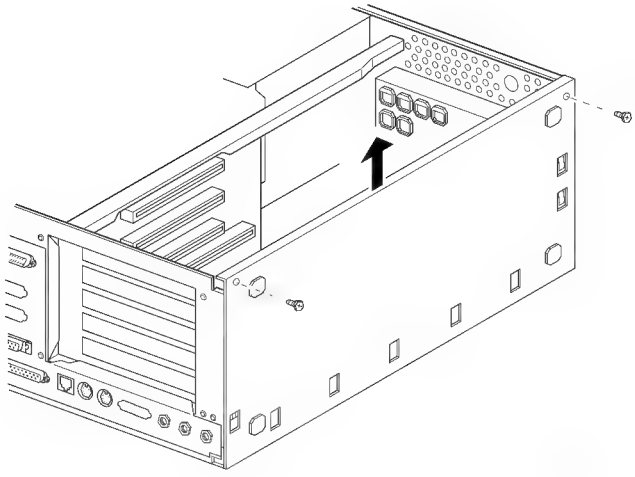
Be careful not to damage components on either the motherboard or add-in cards during this procedure. If necessary, remove any add-in cards located next to the slot where you are installing the new card.

You need a Phillips screwdriver for this procedure.

Use ESD

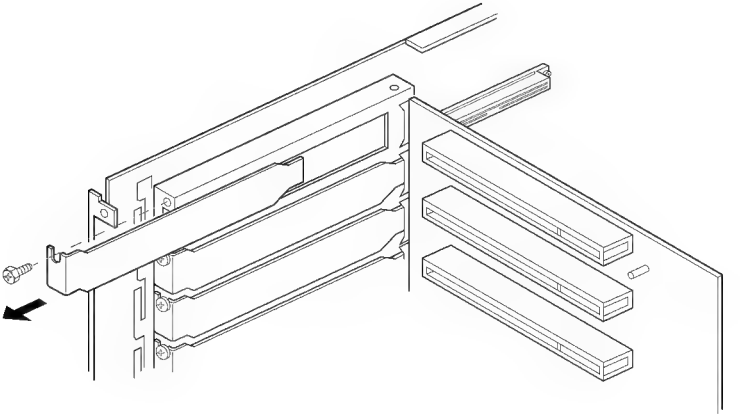
Wrist Strap

1. Perform an operating system shutdown. Turn off power to the system.
2. Remove the cover and lay the chassis on its side. Remove the bottom panel.



11277.00 9602

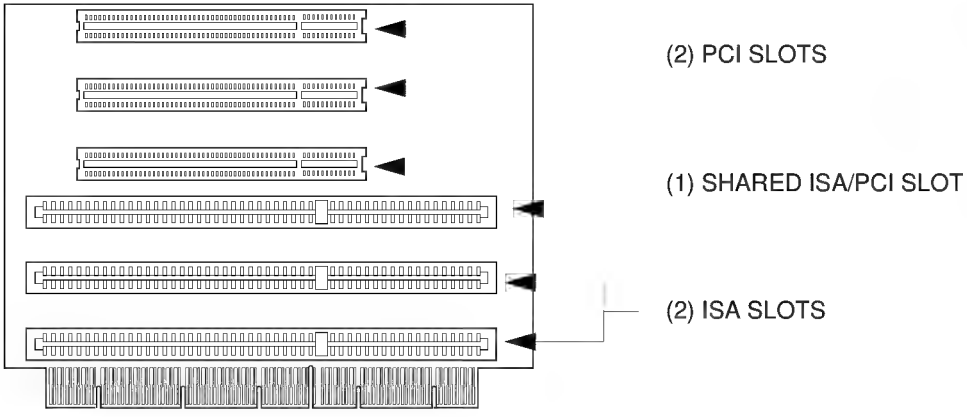
3. The expansion slot cover is secured with one screw. Remove the screw and cover.



11547.00 9609

4. You can now install the new expansion card. Attach any cables supplied with the card.
   Secure the expansion card to the chassis with the screw removed in the previous step.

Note If the L2 cache DIMM is installed, you cannot install a long ISA card in the bottom slot.



5. Install and connect any cards or cables you removed or disconnected.
6. Replace the bottom panel and the cover.
7. Power on the system.

Adding and Configuring Disk Drives

6

In this section, you will find instructions on how to perform these tasks:

- Installing the Floppy Drive, page 6-6
- Installing a Disk Drive in the Front Drive Bays, page 6-10
- Installing a Disk Drive in the Rear Bay, page 6-14
- Setting a SCSI Drive's Address, page 6-18

Supported Drives

There are five SCSI bays in the enclosure. Three bays support standard 5.25-inch half-height removable devices such as the CD-ROM drive. These bays may be used for a standard half-height 3.5-inch disk drives. Two SCSI device bays inside the rear of the enclosure are for one-inch high, 3.5-inch hard disk drives only.

Table 6-1. Supported Drive Devices

Device Type	Vendor	Motorola Part Number	Drive Capacity
SCSI Disk Drives			
Wide, 7200 rpm hard disk drive, 1-inch high	Seagate ST32171W	MPXHDWIDE2GB-K 01-W2951D02B	2GB
Wide, 7200 rpm hard disk drive, 1-inch high	Seagate ST34371W	MPXHDWIDE4GB-K 01-W2952D02B	4GB
Wide, 7200 rpm hard disk drive, 1.6-inch high	Seagate ST19171W	MPXHDWIDE9GB-K 01-W2953D02A	9GB
SCSI Tape Devices			
DAT, 5.25-inch	Seagate 70100109-002	MPXTAPE4MM4GB-K 01-W2670D14D	4GB
CD-ROM Drive			
8X SCSI drive	Panasonic CR-506-B	MPXCDROM8X-K 01-W2039E02B	600MB
Floppy Drive			
3.5-inch Floppy Drive	TEAC FD235HF	01-W2747D01B	1.44MB

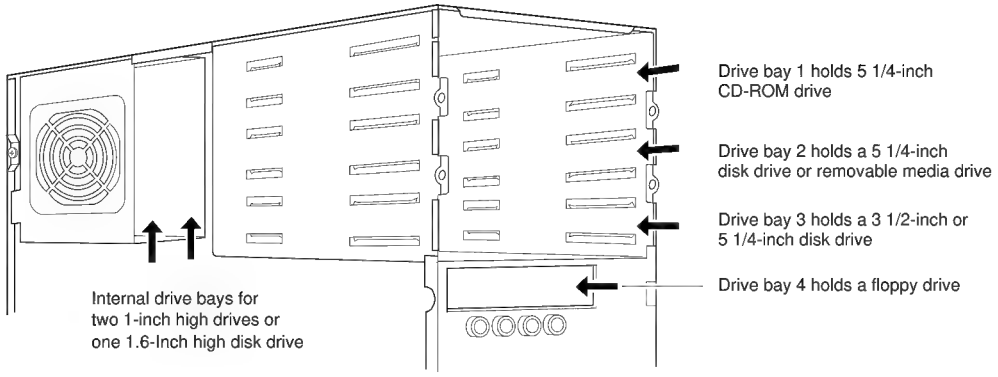
Note The floppy disk occupies its own device bay. It is not a SCSI device and therefore does not consume a SCSI address.

Front (external) and Rear (internal) Drive Bays

The system chassis has four drive bays accessible from the front. The top three drive bays are for SCSI devices and the fourth bay holds a floppy disk drive. All removable media SCSI devices are installed in the top two bays. The rear drive bay can hold a maximum of two one-inch high disk drives or one 1.6-inch high disk drive.

Table 6-2. Disk Drive Placement

Device Type	Location	Maximum Number of Drives
2GB disk drive	Internal bay	2
	External bays	1
4GB disk drive	Internal bay	2
	External bays	1
9GB disk drive	Internal bay	1
	External bays	1 (2nd bay); 3rd bay must hold a 1-inch high device


Drive bay 1 holds 5 1/4-inch CD-ROM drive
Drive bay 2 holds a 5 1/4-inch disk drive or removable media drive
Drive bay 3 holds a 3 1/2-inch or 5 1/4-inch disk drive
Drive bay 4 holds a floppy drive
Internal drive bays for two 1-inch high drives or one 1.6-Inch high disk drive
11660.00 9611

SCSI Bus Length

The maximum SCSI bus length is a total of **three meters**. Use the next table to determine the SCSI bus length.

Device	Bus Length
MPX100 system (internal length)	1 meter
Desktop RAID Subsystems (internal length)	.5 meter
STS-S8P/STS-S16P scsiTerminal Server™ (including external SCSI jumper)	.2 meter
External SCSI cable length (minimum cable length)	1 meter

Note All external round SCSI cables up to and including one meter in length are given an assigned value of one meter. For example, if a system requires the use of a .5 meter cable, that cable counts as one meter in the total SCSI bus length equation. Longer cables are legal and are assigned their actual length value in the total SCSI length equation.

Even though the SCSI specification allows six meters, it does *recommend* a maximum total SCSI bus length of three meters when fast transfers are performed (as in all Motorola systems). Many vendors specify a three meter bus length maximum. The longer the SCSI bus, the greater the chances are for error.

Wide SCSI Device Addressing and Priority

Use these guidelines when setting your device's address.

- The maximum number of devices per wide SCSI bus is 15.
- Narrow SCSI devices use ID's zero through 6.
- SCSI ID 7 is used for the initiator (the controller).
- Wide SCSI devices use ID's zero through 6 and 8 through 15.
- Priority of devices for SCSI bus arbitration is 7 through zero, 15 through 8. Address 7 is the highest priority and address 8 is the lowest priority. This allows narrow devices (which can only be at SCSI ID's zero through 6) to gain SCSI bus control even if a device at SCSI ID's 8 through 15 is also requesting the bus. This is necessary since narrow devices do not recognize devices at SCSI ID's 8 through 15.

Note Removable media devices supported in the system are narrow drives with wide adapters.

Installing the Floppy Drive

Use the following steps to install the floppy drive. You need a Phillips screwdriver for this procedure.

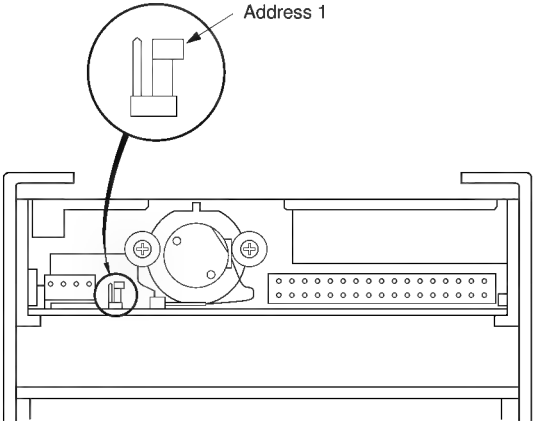
Caution

When you disconnect cables, do not allow them to touch the motherboard.

Use ESD

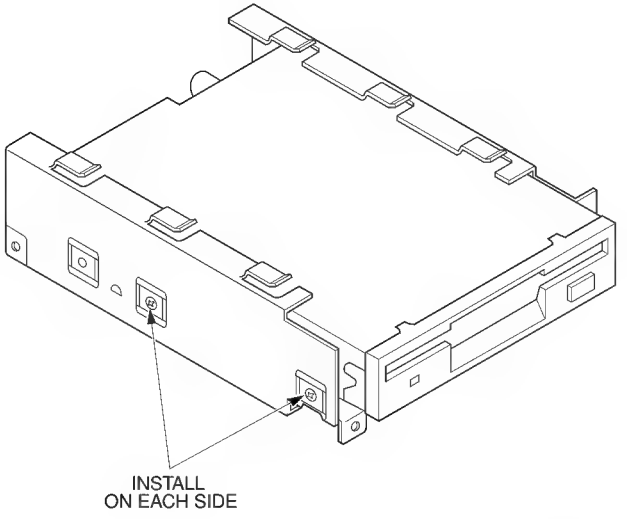
Wrist Strap

1. Perform an operating system shutdown. Power off the system. Remove the cover and the front bezel.
2. The floppy drive should be addressed as drive one. Check that the jumper is set on the correct pin.

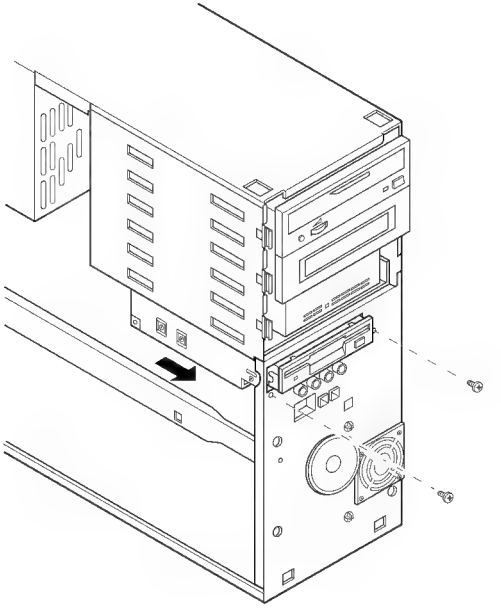


11240.00 9501

3. Remove the floppy drive carrier from the chassis by removing the two screws securing it to the front of the chassis.
4. Insert the floppy drive into the metal drive carrier. Attach the drive to the carrier with four screws.



5. Make sure the chassis is upright. Insert the floppy drive assembly from behind the front panel, making sure the clips on the top of the carrier protrude through slots in the compartment above.
6. Secure the drive assembly to the chassis with two screws.



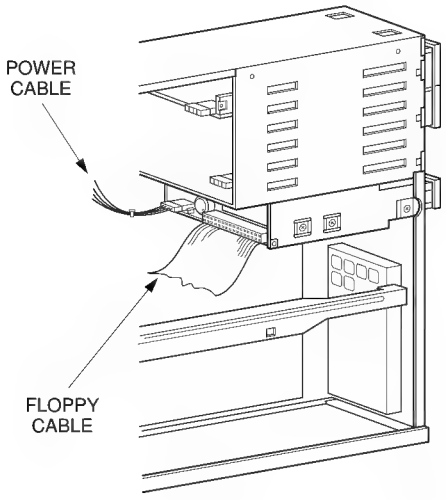
11291.00 9503

7. Attach the floppy drive cable to the keyed connector on the motherboard. Press firmly on each end of the connector.

   Attach the other end of the cable to the connector on the rear of the floppy drive.

   Match pin 1 on the drive to pin 1 one on the cable (red stripe).

   Attach the four-pin power cable to the rear of the floppy drive.



11290.00 9503

8. Replace the front bezel and cover. Power on the system.

Installing a Disk Drive in the Front Drive Bays

The three front drive bays support 1.6-inch high drive devices. A CD-ROM is usually installed in the top bay.

Narrow drives, such as the CD-ROM, must have a 68- to 50-pin adaptor in order to connect it to the wide SCSI cable.

Use the following steps to install a drive into the front bays. A Phillips screwdriver is needed if you are installing a drive in the second or third drive bay.

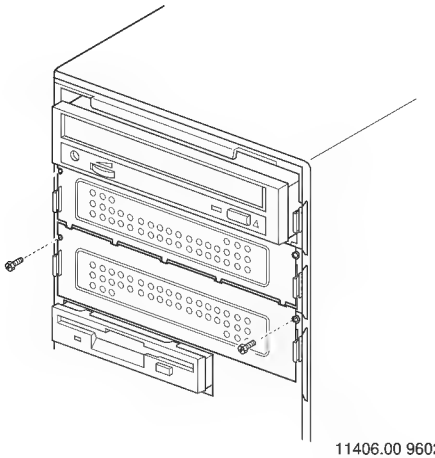
Note All SCSI cables have keyed connectors.

Caution

When you disconnect cables, do not allow them to touch the motherboard.

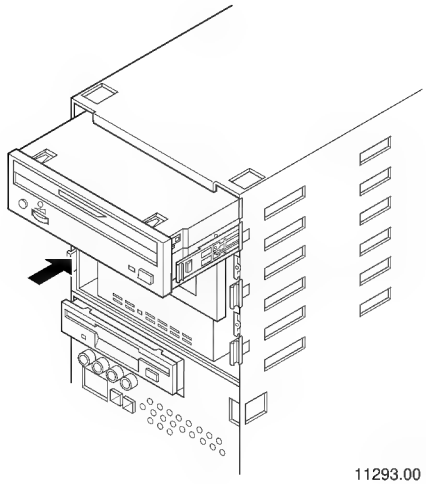
1. Perform an operating system shutdown. Power off the system. Remove the system cover and front bezel.
2. Set the drive's address by placing jumpers on the appropriate pins. Jumper settings for drives are described beginning on page 6-18.

3. A metal plate covers the drive openings below the first bay. If you are installing a drive in one of these bays, remove the two screws and the plate.



11406.00 9602

4. Make sure the two plastic rails installed on the metal drive carrier are securely fastened. Slide the disk drive carrier into one of the SCSI drive bays. Push the carrier into the drive bay until it snaps into place.



11293.00 9503

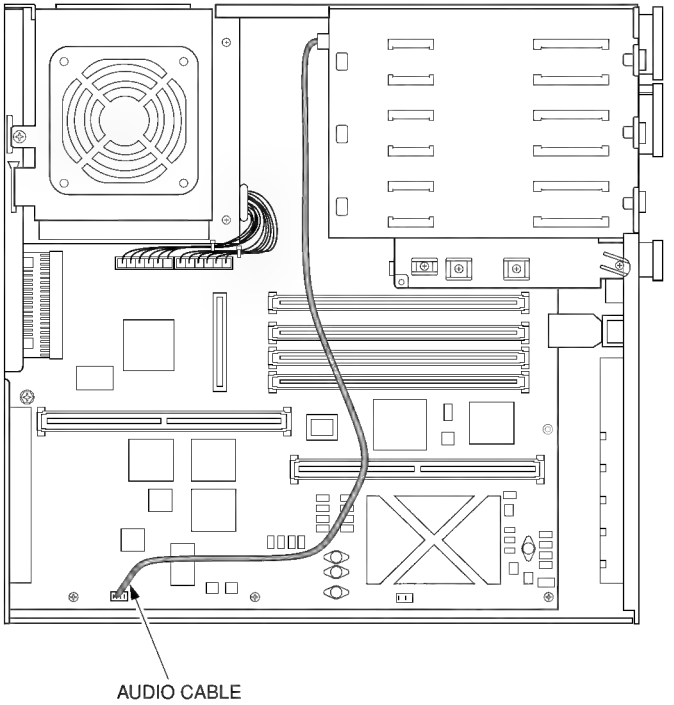
5. Attach the SCSI cable to the connector on the rear of the disk drive.

   Attach the power cable coming from the power supply to the rear of the disk drive. Any free power cable can be connected.

6. Check that the SCSI cable is securely attached to its connector on the motherboard.

7. If no external devices are installed, install a terminator plug on the outside SCSI connector.

8. If you are installing a CD-ROM drive, the audio cable must be installed from the 3-pin connector on the drive to the audio connector on the motherboard.



11550.00 9609

9. If you disconnected cables to other drives, connect them.
10. If removed, replace the metal plate covering the second and third drive bays.
11. Replace the front bezel and cover. Power on the system.

Installing a Disk Drive in the Rear Bay

The rear drive bay (for internal drives) can house a maximum of two, one-inch disk drives or one, 1.6-inch (half-height) disk drive.

Use the following steps to install a drive into the rear drive bays. You need a Phillips screwdriver for this procedure.

Note All SCSI cables have keyed connectors.

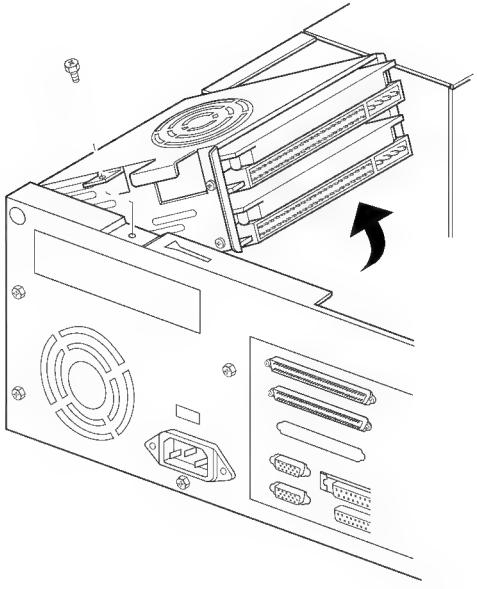
Caution

When you disconnect cables, do not allow them to touch the motherboard.

1. Perform an operating system shutdown. Power off the system. Remove the system cover.
2. Set the drive's address by placing jumpers on the appropriate pins. Jumper settings for drives are described beginning on page 6-18.

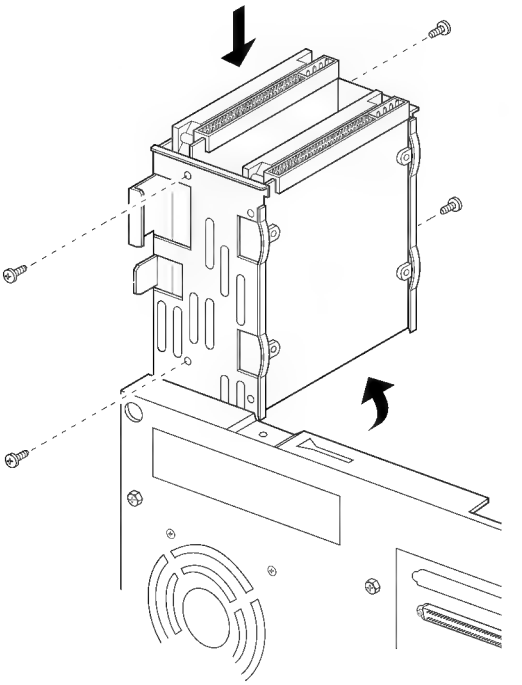
3. Lower the chassis on its side. Turn the chassis so you are facing its rear. The drives are housed in the drive cage at the lower left.
4. Disconnect the SCSI cables and power cables from any installed drives.
5. Remove the screw from the drive cage. Swing the cage up and out.

Note Do not allow the drive cage to drop down into the chassis. While installing a drive, always make sure the cage is positioned all the way back on its hinge.



11295.00 9503

6. Insert the drive into the slot and install four screws, two on each side of the cage. If a drive is already installed in the bay, loosen the screws on both sides of this drive and then insert the new drive. Tighten all screws securely.



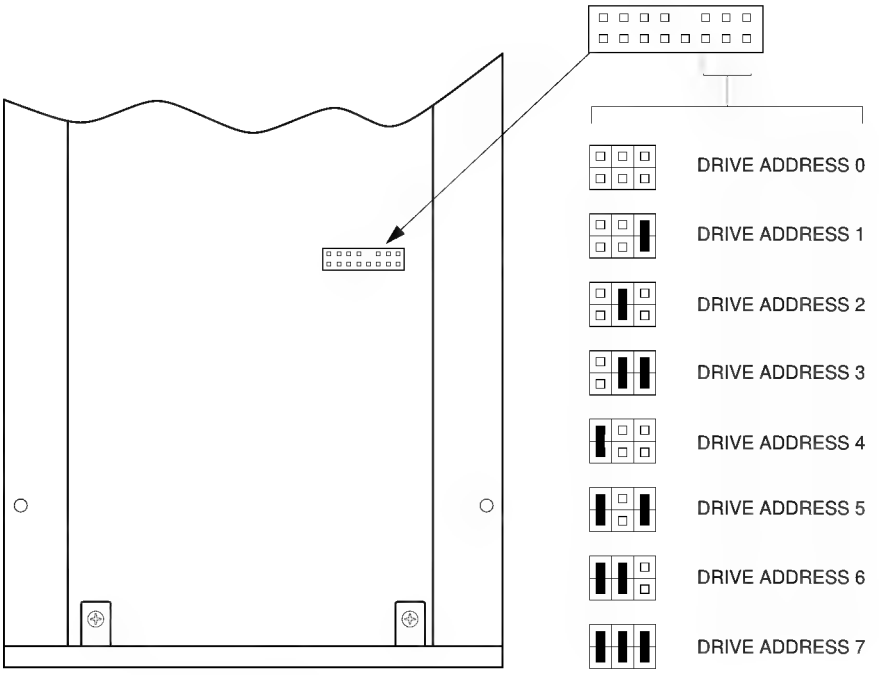
11296.00 9602

7. Position the drive cage by swinging it back inside the chassis. Line up the latch so it passes through the slot in the chassis. Secure the drive cage with a screw.
8. Attach the SCSI cable to the connector on the rear of the disk drive.
9. Attach the power cable coming from the power supply to the rear of the disk drive. You can use any free power cable.

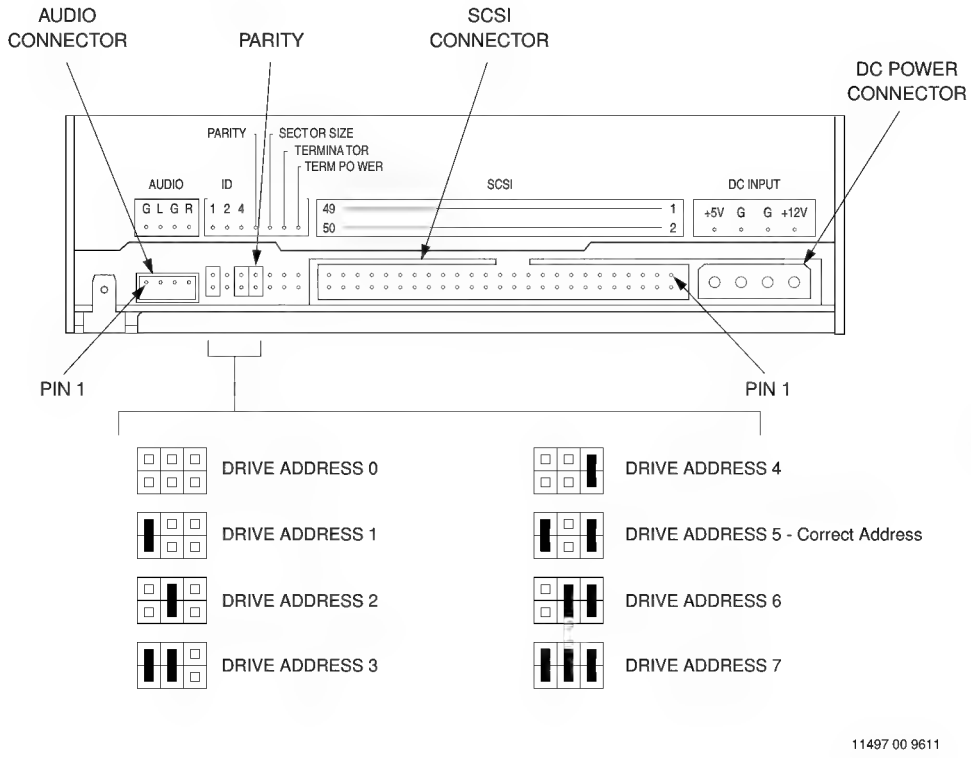
10. Check that the SCSI cable is securely attached to its connector on the motherboard.
11. If no external devices are installed, install a terminator plug on the SCSI connector.
12. If you disconnected cables to other drives, re-connect them.
13. Turn the chassis upright. Replace the cover. Power on the system.

Setting a SCSI Drive's Address

4mm DAT Drive Address Settings



SCSI CD-ROM Drive Address Settings



2GB SCSI Disk Drive Address Settings

This drive has two locations (J1 and J6) for selecting the address, but only one location should be used.

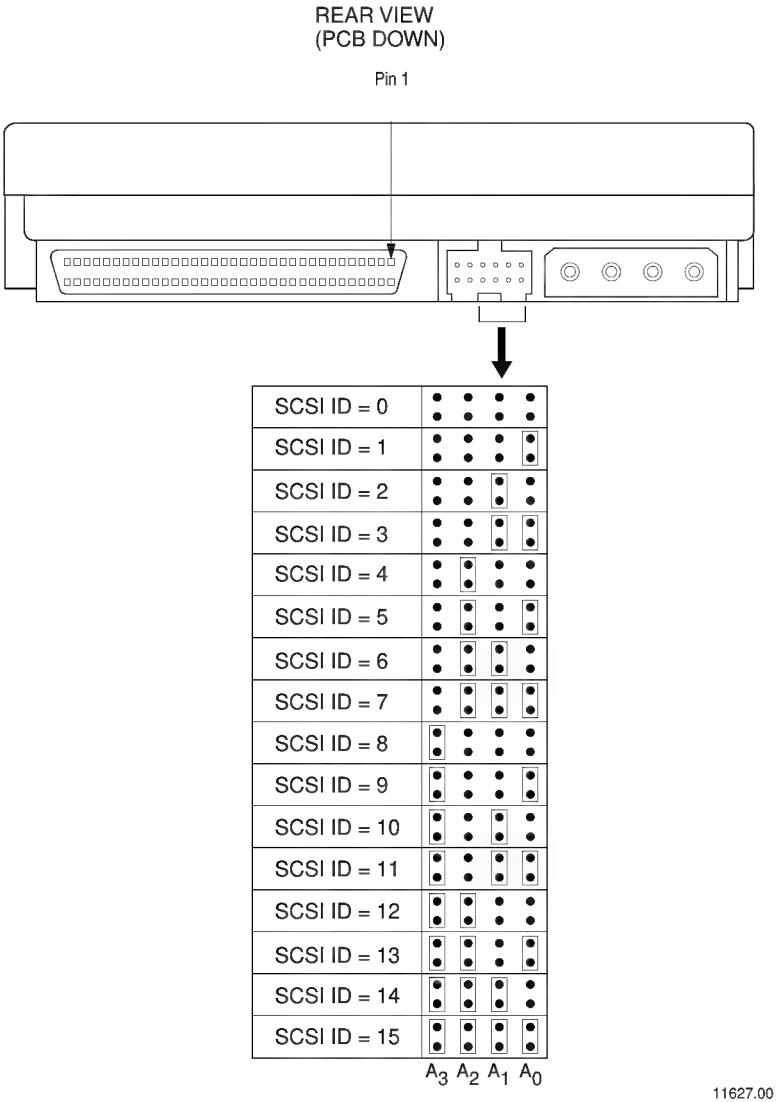


Table 6-3. J2 Header Configuration

Jumper	Setting	Description
TE	Jumper OUT	Terminator Circuits Disabled
DS	Jumper OUT	Spindle Delay Disabled
ME	Jumper OUT	Motor Start Enabled (spin with power)
WP	Jumper OUT	Write Protect Disabled
PE	Jumper IN	Parity Checking Enabled
SS (RES)	Jumper OUT	Reserved Jumper Position
TP1	Jumper IN	Term Power from Drive Enabled
TP2	Jumper OUT	Term Power to SCSI Bus Disabled
NOTE: Do not use the smaller J2 jumpers on J6 since the internal contacts will be deformed and cannot be used on J2 without them falling off and lack of a jumper means the function is off.		

4GB SCSI Disk Drive Address Settings

This drive has two locations (J1 and J6) for selecting the address, but only one location should be used.

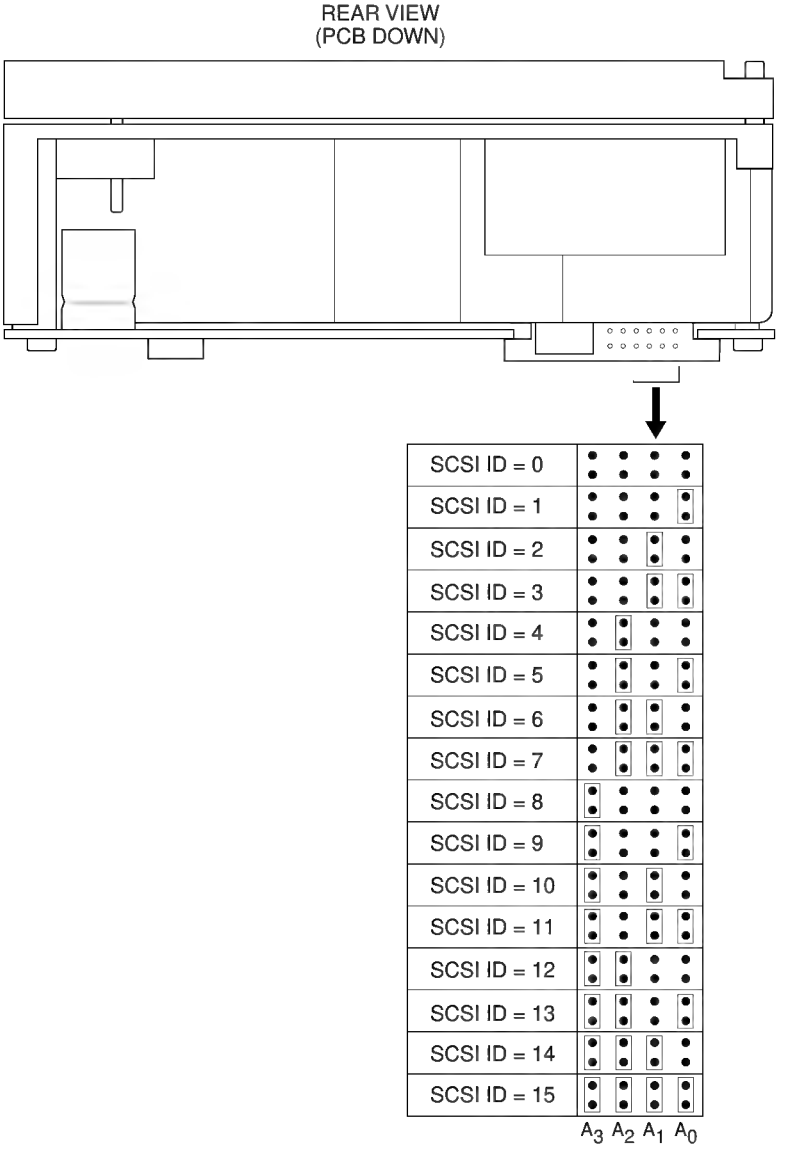


Table 6-4. J2 Header Configuration

Jumper	Setting	Description
TE	Jumper OUT	Terminator Circuits Disabled
DS	Jumper OUT	Spindle Delay Disabled
ME	Jumper OUT	Motor Start Enabled (spin with power)
WP	Jumper OUT	Write Protect Disabled
PE	Jumper IN	Parity Checking Enabled
SS (RES)	Jumper OUT	Reserved Jumper Position
TP1	Jumper IN	Term Power from Drive Enabled
TP2	Jumper OUT	Term Power to SCSI Bus Disabled
NOTE: Do not use the smaller J2 jumpers on J6 since the internal contacts will be deformed and cannot be used on J2 without them falling off and lack of a jumper means the function is off.		

9GB SCSI Disk Drive Address Settings

This drive has two locations for selecting the address, but only one location should be used.

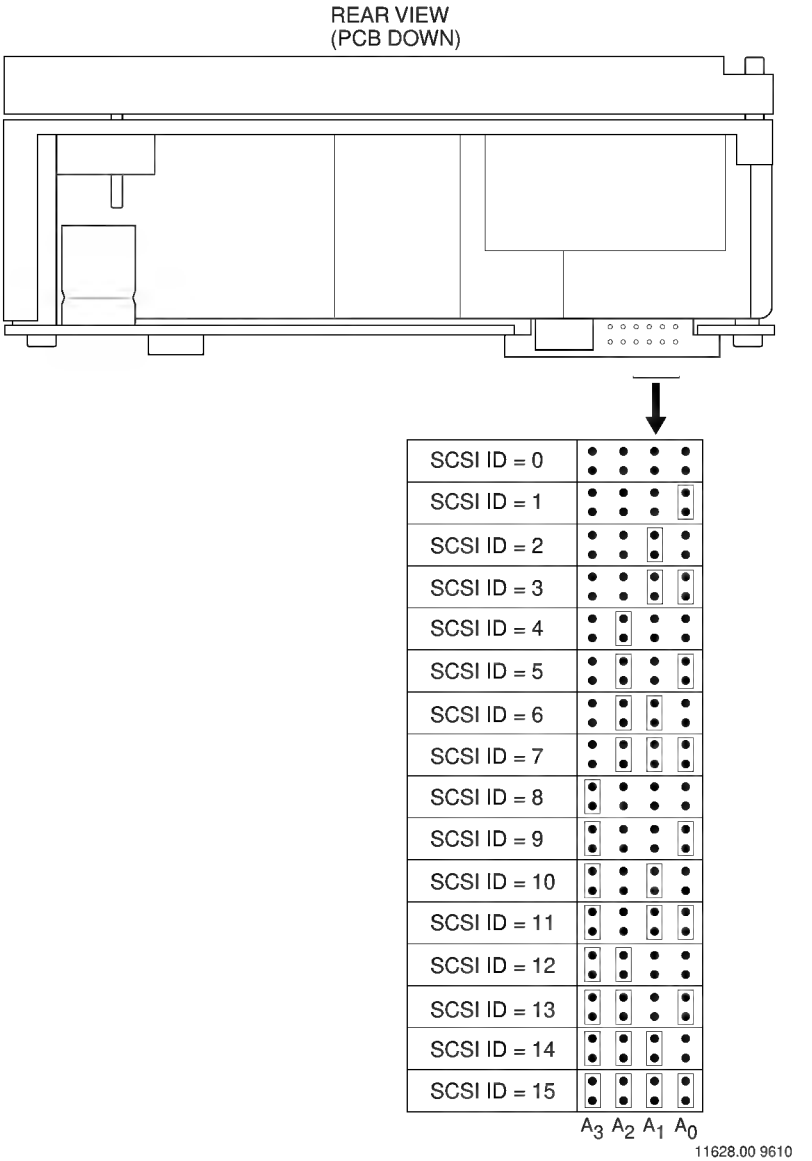


Table 6-5. J2 Header Configuration

Jumper	Setting	Description
TE	Jumper OUT	Terminator Circuits Disabled
DS	Jumper OUT	Spindle Delay Disabled
ME	Jumper OUT	Motor Start Enabled (spin with power)
WP	Jumper OUT	Write Protect Disabled
PE	Jumper IN	Parity Checking Enabled
SS (RES)	Jumper OUT	Reserved Jumper Position
TP1	Jumper IN	Term Power from Drive Enabled
TP2	Jumper OUT	Term Power to SCSI Bus Disabled
NOTE: Do not use the smaller J2 jumpers on J6 since the internal contacts will be deformed and cannot be used on J2 without them falling off and lack of a jumper means the function is off.		

System Connectors

A

In this section, you will find the pinouts on these connectors:

- Power Connector, page A-2
- Fan Power Connector, page A-2
- Small Computer Systems Interface (SCSI) Connector, page A-3
- Ethernet Attachment Unit Interface (AUI) Connector, page A-5
- Ethernet 10/100Base-T Connector, page A-6
- SVGA Graphics Connector, page A-7
- Parallel I/O Printer Connector, page A-8
- Serial Port Connectors, page A-9
- Keyboard Connector, page A-10
- Mouse Connector, page A-10
- Floppy Disk Connector, page A-11
- Internal CD-ROM Audio Connector, page A-12
- Line Input Connector, page A-12
- Microphone Input Connector, page A-13
- Speaker Connectors, page A-13
- Line Output/Headphone Connector, page A-14

Connector Pinouts

The following tables list the pinout assignments for the rear panel connectors.

Power Connector

Pin Number	Signal Mnemonic	Signal Name and Description
1	POWEROK	Power supply operating
2	+5V DC	+5 volts DC
3	+12V DC	+12 volts DC
4	-12V DC	-12 volts DC
5	GND	Ground
6	GND	Ground
7	GND	Ground
8	GND	Ground
9	-5V DC	-5 volts DC
10	+5V DC	+5 volts DC
11	+5V DC	+5 volts DC
12	+5V DC	+5 volts DC

Fan Power Connector

Pin Number	Signal Mnemonic	Signal Name and Description
1	GND	Ground
2	+12V DC	+12 volts DC
3	GND	Ground

Small Computer Systems Interface (SCSI) Connector

Pin Number	Signal Mnemonic	Signal Name and Description	Pin Number	Signal Mnemonic	Signal Name and Description
1	GND	Ground	35	DB12*	Data bus (bit 12)
2	GND	Ground	36	DB13*	Data bus (bit 13)
3	GND	Ground	37	DB14*	Data bus (bit 14)
4	GND	Ground	38	DB15-	Data bus (bit 15)
5	GND	Ground	39	DB1*	Data bus (parity bit 1)
6	GND	Ground	40	DB0*	Data bus (bit 0)
7	GND	Ground	41	DB1*	Data bus (bit 1)
8	GND	Ground	42	DB2*	Data bus (bit 2)
9	GND	Ground	43	DB3*	Data bus (bit 3)
10	GND	Ground	44	DB4*	Data bus (bit 4)
11	GND	Ground	45	DB5*	Data bus (bit 5)
12	GND	Ground	46	DB6*	Data bus (bit 6)
13	GND	Ground	47	DB7*	Data bus (bit 7)
14	GND	Ground	48	DP*	Data parity (bit 0)
15	GND	Ground	49	GND	Ground
16	GND	Ground	50	GND	Ground
17	TERMPWR	Terminator power	51	TERMPWR	Terminator power
18	TERMPWR	Terminator power	52	TERMPWR	Terminator power
19	NC	Not connected	53	NC	Not connected
20	GND	Ground	54	GND	Ground
21	GND	Ground	55	ANT*	Attention
22	GND	Ground	56	GND	Ground
23	GND	Ground	57	BSY*	Busy
24	GND	Ground	58	ACK*	Acknowledge
25	GND	Ground	59	RST*	Reset
26	GND	Ground	60	MSG*	Message
27	GND	Ground	61	SEL*	Select
28	GND	Ground	62	D/C*	Data/Command
29	GND	Ground	63	REQ*	Request
30	GND	Ground	64	O/I*	Output/Input

Pin Number	Signal Mnemonic	Signal Name and Description	Pin Number	Signal Mnemonic	Signal Name and Description
31	GND	Ground	65	DB8*	Data bus (bit 8)
32	GND	Ground	66	DB9*	Data bus (bit 9)
33	GND	Ground	67	DB10*	Data bus (bit 10)
34	GND	Ground	68	DB11*	Data bus (bit 11)

Ethernet Attachment Unit Interface (AUI) Connector

Pin Number	Signal Mnemonic	Signal Name and Description
1	GND	Ground
2	COL+	Collision
3	TX+	Transmit data
4	GND	Ground
5	RX+	Receive data
6	GND	Ground
7	NC	Not connected
8	GND	Ground
9	COL-	Collision
10	TX-	Transmit data
11	GND	Ground
12	RX-	Receive data
13	+12V	+12 volts MAU power
14	GND	Ground
15	NC	Not connected

Ethernet 10/100Base-T Connector

Pin Number	Signal Mnemonic	Signal Name and Description
1	TX+	Transmit data
2	TX-	Transmit data return
3	RX+	Receive data
4	REF	Analog ground reference
5	REF	Analog ground reference
6	RX-	Receive data
7	REF	Analog ground reference
8	REF	Analog ground reference

SVGA Graphics Connector

Pin Number	Signal Mnemonic	Signal Name and Description
1	RED	Red video signal
2	GREEN	Green video signal
3	BLUE	Blue video signal
4	PIXEL 2	Pixel bus (bit 2)
5	GND	Ground
6	GND	Ground
7	GND	Ground
8	GND	Ground
9	NC	Not connected
10	GND	Ground
11	PIXEL 0	Pixel bus (bit 0)
12	PIXEL 1	Pixel bus (bit 1)
13	HSYNC	Horizontal sync
14	VSYNC	Vertical sync
15	PIXEL 3	Pixel bus (bit 3)

Parallel I/O Printer Connector

Pin Number	Signal Mnemonic	Signal Name and Description
1	STB-	Strobe
2	PD0	Data bus (bit 0)
3	PD1	Data bus (bit 1)
4	PD2	Data bus (bit 2)
5	PD3	Data bus (bit 3)
6	PD4	Data bus (bit 4)
7	PD5	Data bus (bit 5)
8	PD6	Data bus (bit 6)
9	PD7	Data bus (bit 7)
10	ACK-	Acknowledge
11	BUSY	Busy
12	PE	Paper error
13	SLCT	Select
14	AFD-	Auto feed
15	ERR-	Error
16	INIT-	Initialize
17	SLIN-	Select input
18	GND	Ground
19	GND	Ground
20	GND	Ground
21	GND	Ground
22	GND	Ground
23	GND	Ground
24	GND	Ground
25	GND	Ground

Serial Port Connectors

Pin Number	Signal Mnemonic	Signal Name and Description
1	DCD-	Data carrier detect
2	RXD	Receive data
3	TXD	Transmit data
4	DTR-	Data terminal ready
5	GND	Ground
6	DSR-	Data set ready
7	RTS-	Request to send
8	CTS-	Clear to send
9	RI-	Ring indicator

Keyboard Connector

Pin Number	Signal Mnemonic	Signal Name and Description
1	KDATA	Keyboard data
2	NC	Not connected
3	GND	Ground
4	+5V DC Fused	Keyboard VCC (fused)
5	KCLK	Keyboard clock
6	NC	Not connected

Mouse Connector

Pin Number	Signal Mnemonic	Signal Name and Description
1	MDATA	Mouse data
2	NC	Not connected
3	GND	Ground
4	+5V DC Fused	+5 volts VCC (fused)
5	MCLK	Mouse clock
6	NC	Not connected

Floppy Disk Connector

Pin Number	Signal Mnemonic	Signal Name and Description	Pin Number	Signal Mnemonic	Signal Name and Description
1	GND	Ground	18	DIR-	Step direction control
2	DENSEL	Density select	19	GND	Ground
3	GND	Ground	20	STEP-	Step pulse
4	NC	Not connected	21	GND	Ground
5	GND	Ground	22	WDATA-	Write data output
6	DRATE0	Data rate 0	23	GND	Ground
7	NC	Not connected	24	WGATE-	Write gate control
8	INDEX-	Index pulse sense	25	GND	Ground
9	GND	Ground	26	TRK0-	Trace 0 sense
10	MTR0-	Motor 0 select	27	MSEN0	Media sense 0
11	GND	Ground	28	WP-	Write protect sense
12	DR1-	Drive 1 select	29	GND	Ground
13	NC	Not connected	30	RDATA-	Read data input
14	DR0-	Drive 0 select	31	GND	Ground
15	GND	Ground	32	HDSEL-	Head select control
16	MTR1-	Motor 1 select	33	GND	Ground
17	MSEN1	Media sense 1	34	DSKCHG-	Disk charge detect input

Internal CD-ROM Audio Connector

Pin Number	Signal Mnemonic	Signal Name and Description
1	AGND	Audio ground
2	LCDIN	Left CD-ROM (audio) input
3	AGND	Audio ground
4	RCDIN	Right CD-ROM (audio) input

NOTE: The Mitsumi connector is compatible with the Panasonic 3-pin connector. In this case, the connector is placed on pins 1 - 3 only, leaving pin 4 open.

Line Input Connector

Pin Number	Signal Mnemonic	Signal Name and Description
1	AGND	Audio ground
2	RIGHT	Right line input
3	LEFT	Left line input
4	RGND	Right ground
5	LGND	Left ground

Microphone Input Connector

Pin Number	Signal Mnemonic	Signal Name and Description
1	AGND	Audio ground
2	MPWR	Phantom mic power
3	INPUT	Input
4	GND	Ground
5	GND	Ground

Speaker Connectors

Pin Number	Signal Mnemonic	Signal Name and Description
1	Speaker OUT+	Positive speaker output
2	Speaker OUT- (KEY)	Negative speaker output (keyway)
3	Speaker OUT+	Positive speaker output
4	Speaker OUT-	Negative speaker output

Line Output/Headphone Connector

Pin Number	Signal Mnemonic	Signal Name and Description
1	AGND	Audio ground
2	RIGHT	Right line input
3	LEFT	Left line input
4	RGND	Right ground
5	LGND	Left ground

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